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ABSTRACT

Presented are 35 brief papers on nutrition and handicapped children (particularly mentally retarded children) which were given at nutrition workshops at the Child Development Center of the University of Tennessee. Topics such as the following are examined: interdisciplinary approaches to nutrition services; the relationship of social work, pediatrics, nursing, psychology, and speech pathology to nutrition; recommended dietary allowances; inborn errors of metabolism; the role of undernutrition in mental retardation; and developmental milestones in feeding. Also treated are such issues as: evaluation of deviations in feeding abilities; feeding skill training; nutrition problems commonly encountered in the developmentally handicapped; childhood obesity; food habits; the continuum of nutrition services required by mentally retarded and developmentally handicapped children following evaluation; and an approach to the continuity of nutrition services for the child with phenylketonurea. Other papers discuss the anatomy and physiology of oral muscalature as related to speech; psychosocial aspects of feeding; the evaluation of feeding problems through a team approach (social workers, nurses, psychologists, educators, pediatricians, and physicians); occupational therapy; case studies illustrating nutritional assessment procedures; and interdisciplinary training for nutrition students. (GW)

FEEDING THE HANDICAPPED CHILD

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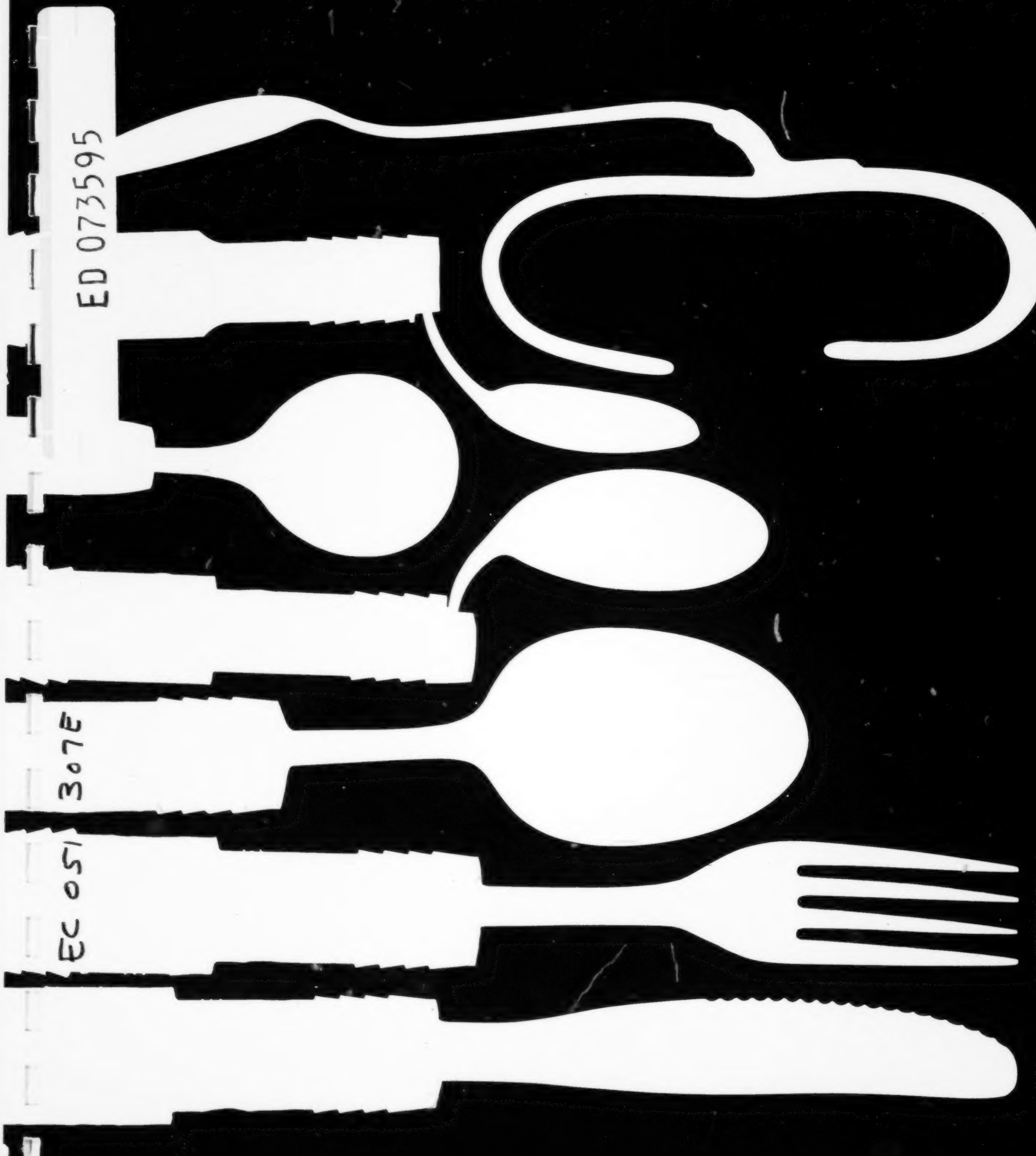

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FEEDING THE HANDICAPPED CHILD

THE UNIVERSITY OF TENNESSEE • CHILD DEVELOPMENT CENTER

Compilation of papers from Nutrition Workshops
given at the Child Development Center edited by

MARY ANN HARVEY SMITH, Ph.D.
Chief of Nutrition

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CONTENTS

The Philosophy of Interdisciplinary Training
Robert G. Jordan, M.D. 1

Interdisciplinary Approach to Services
James R. McCann, Ph.D. 3

Relationship of Social Work to Nutrition
Ludmilla Gafford, A.C.S.W. 6

Relationship of Pediatrics to Nutrition
G. J. Billmeier, Jr., M.D. 8

Relationship of Nursing to Nutrition
Fay F. Russell, M.N. 9

Relationship of Psychology to Nutrition
James R. McCann, Ph.D. 12

Relationship of Speech Pathology to Nutrition
Dolores Henderson, M.C.D. 14

The Recommended Dietary Allowances--Application and Implication
E. Neige Todhunter, Ph.D. 16

Newer Knowledge of Inborn Errors of Metabolism
Helen K. Berry, M.S. 19

The Role of Undernutrition in Mental Retardation
Paul Zee, M.D., Ph.D. 30

Background of Developmental Milestones in Feeding
Dixie Crase, Ph.D. 33

Evaluation of Deviations in Feeding Abilities
Robert Christopher, M.D. 41

Feeding Skill Training
Cathleen Zinkus, O.T.R. 47

Nutrition Problems Commonly Encountered in the Developmentally Handicapped
Kitty Roberts Coffey, M.S., R.D.
Joy Crawford, R.D. 64

Childhood Obesity Or Children, Mind Your F's and Q's
Kitty Roberts Coffey, M.S., R.D. 79

The Dilemma of Food Habits
M. Elizabeth Brannon, M.S., R.D. 94

Feeding Little Folks--As They See It
Kitty Roberts Coffey, M.S., R.D. 98

Continuum of Nutrition Services for the Mentally Retarded and Developmentally Handicapped Child Following Evaluation: The Problem
Harriet Cloud, M.S., R.D. 102

An Approach to Continuity of Nutrition Services for the Child with Diagnosed Phenylketonuria 105
Mary Anne Marshbourne Saadeh, M.S., R.D.

Anatomy and Physiology of Oral Musculature as Related to Speech 112
Bill Collins, Ph.D.

Psychosocial Aspects of Feeding 115
Vaughn E. Stimbert, Ph.D.

Evaluation of Feeding Problems: A Team Approach 120
Mary Ann Harvey Smith, Ph.D.

The Social Work Evaluation 121
Wayne Bland, A.C.S.W.

Nursing Assessment 123
Fay F. Russell, M.N.

Psychology Evaluation 127
Bob Freeman, M.A.

Educational Evaluation of Two Retarded Boys, James and Ricky 130
Jeanette C. Deese, M.Ed.

Pediatric Evaluation 132
G. J. Billmeier, Jr., M.D.

Physical Medicine Evaluation 134
Robert P. Christopher, M.D.

Occupational Therapy 136
Cathleen Zinkus, O.T.R.

Nutrition Assessment of Ricky 137
Mary Ann Harvey Smith, Ph.D.

Nutrition Assessment of James 139
Elizabeth Brannon, M.S., R.D.

Interdisciplinary Training 142
Hazel Cole Capps, M.S., M.A.

Interdisciplinary Training for Nutrition Graduate Students 144
Mary Ann Harvey Smith, Ph.D.

Affiliated University View on Training Opportunities In University-Affiliated Centers 148
Lura M. Odland, Ph.D.

Feeding the Handicapped Child: A Challenge to Nutritionists and Food Service Managers 150
Beth Duncan, M.S., M.P.H.

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PREFACE

This volume was inspired by a Seminar on ***Nutrition and Nutritionists: "Their Roles in Mental Retardation"*** held at the Child Development Center, The University of Tennessee Medical Units, Memphis. It exemplifies, as did the Seminar, the need for promoting and adjusting to the educational, scientific and technological advances influencing the food habits and nutritional status of children.

The programs of University-Affiliated Mental Retardation Training Centers, including the Child Development Center in Memphis, have been planned to enhance and broaden the opportunities for students in many areas who are interested in the handicapped child, as well as to provide a service for the "community" in its broadest concept. It is increasingly evident that the nutrition of children, both the so-called "normal" child and the child with one or more handicaps, is an integral factor in total development. The interdisciplinary approach to child development so effectively developed by Dr. Robert G. Jordan and his staff at the Center includes nutrition as an important part of the total program supported by all disciplines on the staff. Mutual regard and respect among various disciplines is epitomized by the program of the Child Development Center at The University of Tennessee Medical Units.

The papers prepared for the Seminar and this volume discuss the nutritional needs of children with the philosophy of the interdisciplinary approach to specific problems. This concept of working with a particular problem from various aspects in a team effort has been proposed many times; however, there are very few organizations or agencies where this concept is so effectively implemented with strikingly obvious benefits for research, training and service as in the Center. Merging view points of those with first-hand knowledge of developmental needs contribute to the wealth of information useful to those entering or practicing in health-related professions.

Of overall concern too are the problems of a family with the superimposed pressures of a mentally retarded child. This is a problem area that has been long-overlooked. The Center is providing a realistic approach for all of us who are interested in serving such families.

Dr. Lura M. Odland
Dean and Professor of Nutrition
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Robert G. Jordan, M.D*

THE PHILOSOPHY OF INTERDISCIPLINARY TRAINING

It is clear that the body of knowledge available for treating and handling the handicapped is much greater than any one discipline can know or utilize. Experience has shown that merely adding up previous specialty offerings does not suffice. There must be ***interaction*** for ***consensus*** answers. The current and projected manpower shortages add to the demands that the most efficient use be made of the available facilities and professionals.

Thus, the need to give training to many related specialties in a common setting, dealing with common problems has become obvious. ***Interdisciplinary training*** tries to answer this charge through interdisciplinary training centers which serve as models for demonstrating improved approaches for supplying services to those with chronic problems such as handicapping conditions. In answering service needs the public has not always understood that improved service comes through better training of more people. It has always been easy to think only about direct service to the patient today and not about "long range" planning. If future needs and adequate prevention are to be answered, consideration must be given to both the number of trainees and the quality of the training. An interdisciplinary training program can provide this comprehensive program for multiple specialties.

A truly balanced and functional interdisciplinary training program is difficult to attain. The ideal of giving equal recognition, voice and importance to each speciality is basic, though the roles and contributions are different for each. There are many overlaps that have to be recognized and accepted by the well-qualified professionals in each discipline. An attitude of cooperative "working together" for answers is indicated for all staff members in approaching both the service and the training aspects.

Considerable attention has to be given to the special characteristics of each discipline and its inter-relationship with other disciplines. For the trainee within a particular discipline to obtain an optimum experience, not only must there be orientation to the function of his own discipline and to the function of other disciplines, but more especially to the interactive process as disciplines work together.

There are many kinds of interdisciplinary teams and much depends on the personal-social interaction of their members. A major factor is the spirit of acceptance of one another by the various team members and the recognition and acknowledgement of areas of competency of the other professionals on the team. Certain standards of excellence have to be maintained for every discipline if demonstrations of the ideal are to be shown to trainees and to those receiving the services. At times there is concern for the recognition of a discipline as a fully competent and functional member of the interdisciplinary team. If there is true acceptance of each discipline as having something unique to contribute in its own right, then the need for a defensive orientation to the interdisciplinary setting is lessened and the goal of the total team function is enhanced. Intellectual acceptance of such a philosophy is not enough; there must be true acceptance of the worth of other disciplines. Extensive orientation to all disciplines and functions of the Center should be given to new staff members before they begin their duties. Most will not have background in an interdisciplinary setting, though well qualified.

Relationships with the faculties of participating universities must remain workable. The concept of giving "joint academic appointments" of appropriate staff members in both inside and outside departments might well foster relationships so there is keener understanding of the Center's program and consequently encouragement of student trainees.

Not only should these be trainees at high levels who will become MR specialists, but they should come from all academic levels. In addition, orientation of volunteers and other interested lay people can have much impact in understanding and handling of the retarded. This stimulates the interest of many individuals to go into this field before their careers have been decided in another area. It is then essential that the training program continue to challenge the student so that employment in the MR area results.

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There are other factors which may enhance true interdisciplinary functioning in a Center:

(a) A well-designed building is necessary for a high staff ratio, good audiovisual aids (including closed circuit television) and adequate conference and classrooms. Interaction between disciplines and trainees can be enhanced by purposely placing the offices so that those next door are in different disciplines.

(b) A great deal of autonomy is also necessary. This includes administration, planning of curriculum, selection of qualified and certified staff members, funding of staff and trainees through the Center and selection of universities and departments from whom trainees will be accepted.

(c) Appropriate administrative direction is essential to maintain balance among the various disciplines which is consistent with the goals of the total program.

(d) In further carrying out the interdisciplinary approach a "consensus" type of report reflects the combined efforts of the team rather than of individual members.

(e) Trainees, faculty and other employees should be oriented to many types of facilities which serve handicapped patients.

(f) Adequate recognition and definition of the roles of both trained and untrained people is needed.

In addition to the primary function of training, other goals of an interdisciplinary training center should be (a) providing services, (b) participation in community and regional activities, (c) serving as an information and referral source, (d) recruiting of professional trainees and (e) performing research.

When put into practice, interdisciplinary knowledge should result in more efficient use of professional time and better service to patients. This is true even if the professional is working alone or in an "unsophisticated" setting.

James R. McCann, Ph.D.*

INTERDISCIPLINARY APPROACH TO SERVICE:

A CASE DISCUSSION

The interdisciplinary approach to service requires the various disciplines to interact and work together before, during and after the evaluation. An admissions team must consider the referral information in order to decide if the child should be accepted for study or if he might more appropriately be helped at another facility. There is no place for the so called "blind diagnosis;" there must be continuous staff interaction during the evaluation process. In dealing with a long standing problem involving something as complex as a "learning problem" each individual evaluator needs all the help he can obtain not only from those who are seeing the child currently but also from those who have known him in the past. The team members must have mutual respect for each other's findings, and they must be flexible enough to make effective use of these results even when they do not agree with one's own impressions. The threatened and defensive staff member will not be able to function in an interdisciplinary team setting.

Although much of the interdisciplinary interaction will take place informally during the course of the evaluation, arrangements must be made to insure that all staff members will have an opportunity to discuss the individual evaluations and to integrate these findings into a single all inclusive consensus report. This may be done at a scheduled staff conference where the findings are summarized, recommendations made and a decision reached as to which team members should discuss the results with the parents. It is decided at this time where reports of the evaluation should go and if there should be any restrictions on content of reports. It is also decided if future contacts with the child or his family are needed. This may involve a complete re-evaluation or follow-up contacts by certain specific disciplines. In either case when such contacts are made staff conferences must be planned so that all concerned may be brought up to date on the status of the case. These conferences also make it possible for the discipline involved in follow-up contacts to seek the aid and advice of others familiar with the case.

Perhaps the interdisciplinary approach can be illustrated by discussion of an actual case. The initial evaluation was done when this child was 3 years of age. He was the third of four boys in the family, and the parents had become concerned because this son was so slow to learn. Social work, speech pathology, psychology, pediatrics and neurology participated in this evaluation. The child was found to be able to say only a few words, and his motor development was delayed. At the staff conference there was an agreement that the child was retarded, but there was considerable discussion concerning the degree of retardation. Because of the lack of language, it was very difficult to obtain an objective measure of intelligence. It was finally decided to give him the benefit of a doubt and list his level of retardation as mild. Since no one was particularly comfortable with this diagnosis, it was suggested that a nursing home visit be made in the near future. This was done and the nurse's impression was that he behaved as a mildly retarded child. It was brought out that he would probably be able to function well in a year or two in a pre-school program for retarded children. The staff felt it would be desirable to re-evaluate this child before he was of school age, and this was recommended to the parents at the informing interview. The mother appeared to be more affected by the results of the evaluation than did the father. She cried and was quite upset but at the same time appeared to have a more realistic understanding of her son's condition. The father said he "knew it all along," but he did not seem to really grasp the seriousness of the problem and the need to plan for the future.

It should be noted that at the time of the initial staff conference the neurologist commented that this child was slightly obese.

During the next two years there were a few contacts with this family, particularly by nursing and social work, but it was not until he reached the age of 6 years that the mother called asking for help. She was having difficulty getting the child into school, another of her children had developed a serious illness, and the father deserted the family. The child was not yet toilet trained, and the social worker noted at the first interview that he "appeared as a very obese 6 year old." During this evaluation he was seen by nutrition and nursing in addition to the disciplines who had participated in the earlier evaluation. This time all agreed that he was more retarded than originally thought, and he now appeared to be functioning at a moderate level of retardation. There was language retardation, and he had become hyperactive, uncooperative and emotionally labile. It was felt that much of his behavior could be attributed to the mother's lack of knowledge and ability to control him. She was inconsistent in the use of discipline and tended to overprotect him. The staff agreed that the mother would need help and support in carrying out any recommendations made for her child.

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The findings were discussed with the mother by the social worker and the pediatrician. She was able to accept the opinion that her son was more retarded than was originally thought. She seemed to expect to hear this, but it was still very painful for her and she cried almost continuously while discussing her son. She agreed to the recommendation of the staff that he now be enrolled in a pre-school program for retarded children, yet at the same time she kept finding reasons why it would be impossible for her to accomplish this. This problem had been anticipated by the staff and arrangements had already been made for nursing home visits to help develop self-help skills and better techniques of discipline. Social work counseling with the mother had been planned to provide support and encouragement, and this as well as the nursing visits would facilitate the carrying out of the staff recommendations.

Although obesity had only been mentioned in passing at the time of the first evaluation, this problem was one of the first noted when the second evaluation was begun. At the time of the nutrition evaluation it was discovered that this child's obesity had far reaching effects. One reason he had been unable to enter school was his not being toilet trained. The nutritionist noted that his waist was so large and his trousers so tight that he could not fasten and unfasten them with any degree of efficiency. It was simply too difficult for this mentally retarded boy to learn to take his pants down.

The nutrition evaluation was done when he was 6 years, 4 months of age. The presenting nutrition problem was ***obesity***. He weighed 83 pounds (normal, 53 pounds) and was 45 inches tall on the day of the evaluation (Figure I).

The mother described his appetite as "extra large." She further stated that he ate all his food plus the food on his brother's plate if not carefully supervised. He had been known to eat cold grease out of a skillet left on the range. His food habits were good. He liked everything. He did have some difficulty chewing coarse and fibrous meats and did seem sensitive to extremes in food temperatures. The child was consuming more calories than recommended by NRC as exemplified by the 24 hour recall.

Breakfast	*Lunch*	*Dinner*	*Snacks*
Bacon, 2 slices	Hamburger Pattie, 3 oz.	Meat Loaf, 3 oz.	Watermelon, Small Wedge
Fried Egg (1)	Cheese, 1 oz.	Potato Salad, 1 cup	Vanilla Wafers (6)
Toast, plain, 2 slices	Pickle, sweet, 3 slices	Ravoli, 1 piece	Sugar Cookies (4)
Margarine, 1 pat	Bun, (1)	Yellow Layer Cake, 1 slice	Pepsi, 10 oz.
Berry Jelly, 2 tsp.	Orange Drink, 5 oz.	Chocolate Frosting, 2 tbsp.	
Milk, 1 cup			

He was given vitamins sporadically as his mother thought he needed them. He was a healthy child and had very few colds and experienced no digestive disturbance. At the time of the evaluation, he was incontinent and enuretic. His waist was so large that he wore size 12 pants, and they were so tight that he could not snap them.

The child was described as hyperactive--yet the activity in which he engaged was not strenuous. He was unable to join his brothers in active sports because he didn't understand the rules. He slept quite a lot, taking a nap every afternoon and sleeping eight or more hours nightly.

The family's income was limited. The parents were separated, and the mother and her sons were living with her parents. The family did have a space for a garden and had a home freezer. Thus, vegetables and fruits were available most of the year. This family seemed to depend upon food for socialization and used a large portion of their income for groceries.

It was the impression of the nutritionist that this child was obese primarily because of his excessive food intake, the high calorie content of his diet, his uncontrollable appetite and his inability to engage in active play. A trial on a 900 calorie reduction diet was recommended with interpretation to the mother and the grandmother.

The mother and the grandmother were instructed on the mechanics of the diet. Arrangements were made for diet records to be kept daily for the first few weeks and return clinic visits were scheduled on a bi-weekly basis. Within two months some weight loss had occurred, and he now weighed about 77 pounds (loss of 6 pounds). Much encouragement was necessary. He had tried the patience of his mother by sneaking food, e.g., chocolate pudding. It was decided to allow diet colas as well as low calorie gelatin as foods "just for him". As he progressed the mother was encouraged by success and wanted to continue with the dietary follow-up. At regular intervals pictures were made to show his progress. This was found to be a definite reinforcement for this child.

During this period the nurse reported following a home visit that the child had entered a pre-school for retarded children and was adjusting well. He had improved in his self-help skills and showed great interest in his diet. His mother reported that he was better coordinated and "just seemed to handle himself better" since he had lost weight (Figure 2). Soon after this he did achieve success in toilet training. Approximately seven months after the nutrition program was begun, this young man entered a public school class for retarded children. It was hoped that with school placement he would become more active and his calorie requirement would increase.

The nutrition summary ended on a philosophical note that would probably apply to many others as well as to this young fellow--"It seems a little sad to have such a low tolerance for calories when one of his greater pleasures in life is eating."

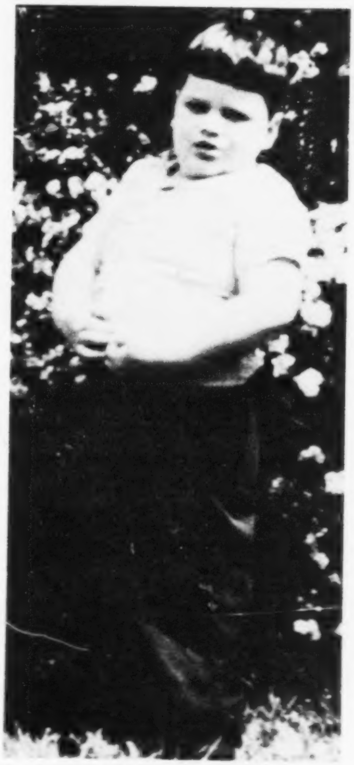

Figure 1

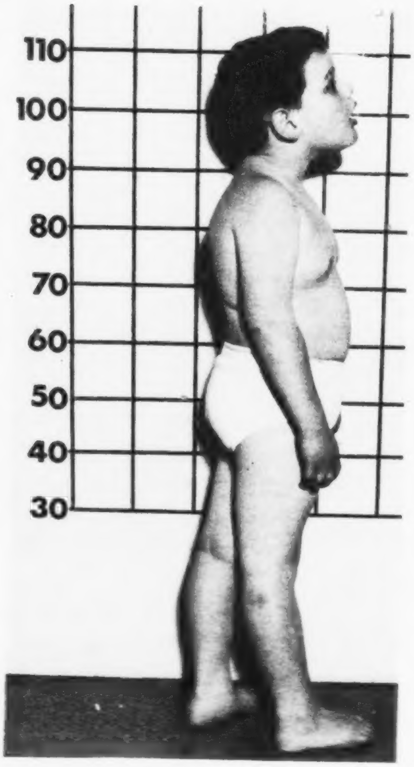

Figure 2

Ludmilla Gafford, ACSW*

RELATIONSHIP OF SOCIAL WORK TO NUTRITION**

Food and eating habits relate to the most basic of human needs. The one that is the first to be developed is that of securing oral gratification. Problems in this vital area, if unresolved, will continue to affect other developmental phases. Mother-child conflicts , begun during the oral phase will continue if unresolved. Unfortunately, with a retarded child an oral phase is a period of many potential problems. A retarded child often has some organic problems interfering with satisfactory and satifying food intake. He may be lethargic or hypotonic, slow to suck. There may be organically induced hyperactivity that causes him to be a squirmy, tense infant who does not relax in his mother's arms. He may be a collicky, crying baby. A retarded child is generally slower to wean, just as he is slower with other phases of his development. If a mother does not know to expect this, she may become impatient and may push performance too hard, with a battle ensuing between them.

It is a very normal human need for the mother to want her young child to enjoy being fed, whether from a breast or a bottle. An infant who does not eat satisfactorily and is too squirmy or poorly coordinated to cuddle comfortably is a disappointment to his mother, unless she has unusually strong maternal learnings or understands the problems. The child in turn senses his mother's disappointment; some of this may be overtly expressed by less fondling and being picked up. The child may react by withdrawal or some negative behavior. In these ways an early pattern of mother-child tensions may be established. Unless corrected, these tensions will carry over into the toilet training phase and later into the phallic phase where a child learns to relate to members of opposite sex.

In view of emotional significance of feeding to the parent as well as the child, the importance of learning to do a good exploratory nutrition interview with parents becomes of vital importance. Some observations and suggestions from the field of social work are directly applicable for a nutritionist as well. A professional interview is a purposeful, directed conversation in which one person takes responsibility for its development. The interviewer operates within a special and defined setting and speaks from a background of organized experience and recognized competence. (1) Each exploratory interview has a beginning, a development of its purpose and an ending, with certain essential aspects to each phase.

An exploratory interview may be initiated by the parents because of their questions and concerns. The first task of a professional is to start where the ***parents*** are to find out their pressing concerns and problems. This can be done by some general questions as to purpose of their coming, giving them plenty of time to tell and beginning the long process of listening "hard." as they tell their story (2). This initial involvement of the parents in talking helps them participate actively from the start in the process of the interview. If the interview is at the initiation of the nutritionist, then the parents are entitled to a clear explanation of its purpose and why they were selected or requested to come, with time left for asking questions. Establishing rapport is an on-going process, early begun. Conveying to parents genuine interest and concerns about their problems and feelings is essential. An attitude of non-judgmental acceptance of the parent, with his anxieties, fears and anger is an important ingredient. Any professional person dealing with the parents of a retarded child needs to know his own attitudes and biases. It does not mean a surpression of feelings, which only results in artificiality. Instead, what is needed is an awareness of our feelings so that we can better control their expression. It involves differentiating between the parents' standards and those of the professionals working with with them, not condoning the mistakes, but seeking instead to understand the reason (3). With an upset or anxious parent there may emerge temporarily some underlying feelings of excessive dependency or fears during the initial exploratory interview.

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[**] **Presented at Nutrition Workshop, Child Development Center, June, 1969**

Development of an exploratory interview involves securing information needed by a nutritionist. Posing general questions which encourages the parents to talk about some aspect of nutrition is an effective way to begin this phase of the interview. This involves active listening, which means continuing to convey interest through pertinent questions or comments. When specific information needs to be elicited, questions should be paced to the parent's ability to understand, with ample time given to answer thoughtfully rather than being pressured or hurried. Any explanation or information needs to be given with due cognizance to the physical ability of the parent to understand. Is he able to hear well enough? Is he hampered by a language barrier? Explanations need to be geared to the ability of the parent to understand, with due consideration to cultural factors, level of education and ability to grasp concepts and ideas. More subtle and difficult to handle are blocks to comprehension related to psychological factors (4). There an interviewer's sensitivity to a parent's mood comes in. A parent may be so anxious or depressed that little of what is being said comes through to him. Most professional people can themselves remember that they have been in situations when they were so preoccupied with pressing problems that it was difficult to concentrate on a conversation. If a parent is still too overwhelmed with grief or sorrow about his child's retardation or about other worries, opportunity to share this with an empathic listener may pave the way for more active involvement later in the interview.

The ending of an interview should come about when the purpose of the interview is either achieved or its achievement postponed. This necessitates that the parent as well as the interviewer be clear about the purpose, so that ending an interview is a mutually shared act, rather than arbitrarily imposed. Time factor is an essential consideration. There should be ample opportunity for a parent to ask questions or to bring out points earlier overlooked (5). Writing down some necessary information can at this time be expeditiously done.

It is vital that at the end the interviewer remain responsively interested in the parents, not becoming impatient to terminate or in a hurry. If further contacts are planned, this is the time to talk of these, in essence, building a bridge into the future. This is a good time for giving concrete information and writing down specific guidelines.

Good interviewing is an art to be learned and developed and is one of the most universal of human activities.

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G. J. Billmeier, Jr., M.D. *

RELATIONSHIP OF PEDIATRICS TO NUTRITION

Among the fields of specialized medicine none has a greater responsibility nor wider scope than pediatrics. The ultimate goal of the pediatrician is allowing the child to reach his fullest potential in adulthood with optimal development, physically, mentally and socially. Realistic achievement levels must be set for children of various bodily proportions and capabilities with or without obvious physical and mental handicaps. Essentially each child must be managed as an individual.

The child with mental retardation or developmental handicaps presents a most complex problem in assessment and management. The term "handicap" refers to impairment of normal activity or achievement because of a mental or physical defect. Often the child has combined defects such as the blind-deaf child or the spastic child with associated mental deficiency.

After recognition of such special problems the child requires a complete evaluation of physical, psychological and social parameters. Ideally this evaluation consists of a "team" approach with experts of many disciplines complementing the pediatrician's assessment of the child. The nutritionist serves as an integral member of this team to which the pediatrician relates in both diagnosis and management of the handicapped child.

Treatment of the retardate or developmentally disabled child again lends itself to the team approach. All avenues must be explored to provide the child with ample opportunity in attaining his maximum achievement potential. It must be emphasized that such cooperative management is a continuum toward a final goal rather than an isolated evaluation and recommendation without follow-up.

A prime example of the pediatrician-nutritionist team is apparent in the diagnosis and management of the child with an inborn error of metabolism. Blending their skills of physical diagnosis, biochemical assessment and dietary management such children, when detected early in life, may be spared the devastating effects of such diseases as phenylketonuria and galactosemia.

Another cardinal example of pediatrician and nutritionist combining efforts is evident in assessing and managing the retardate with multiple physical handicaps. Recognition of specific physical limitations, their magnitude in restricting activities such as feeding, and planning a realistic program for physical therapy, a feeding skills program and a balanced nutritious diet are all more efficiently handled through a team effort.

Good nutrition is essential to good health and the pediatrician must be ever aware of deviations from nutritional adequacy using his clinical acumen and that of the nutritionist to provide for optimal conditions in the growing and developing child. There is no substitute for preventive measures and anticipatory guidance in considering nutritional inadequacy.

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* Chief of Pediatrics, Child Development Center, University of Tennessee Medical Units, Memphis, Tennessee

Fay F. Russell, M.N.*

RELATIONSHIP OF NURSING TO NUTRITION **

Past experiences with members of your profession were brought to mind, while I was pondering over what could be said to a group of distinguished nutritionists in attempting to explain nursing roles. In a hospital pediatric unit, working with children who suffered from burns, and diabetes mellitus, the nutritionist was an innovative and creative member of the team planning care for these children. Later, as a colleague on a nursing faculty, in addition to her teaching assignment, she gave of her time and talent to such problems as overweight students. Having had several such positive experiences with nutritionists, I joined the CDC with the anticipation of additional pleasurable working experiences with the nutritionists as well as with the entire interdisciplinary team. As the nutrition component was being developed, the high degree of scientific expertise exhibited in the basic sciences as well as its practical application is impressive. As the nursing component is being developed, it is not surprising that we have found common problems. Some overlapping exists--as with other disciplines--however, this presents little or no problem as there is an abundance of both nursing and nutritional problems with retarded children and their families.

Our focus in nursing in mental retardation is on the family, whose members must come to grips with the problem. How can we help prevent added problems? How can we help the family to maximize potentials of the child? In what way can we best help the family to cope? These are questions we ask ourselves in assisting the families with whom we work on a long term or follow-up basis. It becomes the responsibility to assist families find ways of handling the problem(s) of a child who does not fit into the normal patterns of expectations and the normal patterns of child rearing.

Our role in the diagnostic study may differ from center to center; however, most agree that assessment of: (1) family functioning at home, (2) methods of discipline and management of the child, (3) degree of independence in self-help skills are responsibilities that are in the realm of nursing. A visit to the home permits more accurate observations and the following guide is utilized in organizing the observations and assessment by the nurse in the home.

I. ***Environment: Home***

A. Neighborhood - upper middle lower
B. House - painted and in good repair yes__ no__ neat yes__ no__
Front yard
Back yard
  Fenced-
  Equipment-
  Hazards-
  Other
C. Interior:
  Number of rooms Bedrooms
  Furnishings-
  Appropriate toys: yes__ no__ describe
  Play area yes__ no__ describe
Hazards - Poisons Insecticides Bleach Kerosene
  Stored or handled safely:
Where do children study?

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** Presented at Nutrition Workshop, Child Development Center, June, 1969

II. Members of the household - Comment on family members

Father -
Mother -
Children - list

Include developmental screening done on siblings

Others - relationship
Describe child that is being studied

III. Communication and interaction among family members:

Describe -

Speech and language at home

How does child relate to nurse as a stranger

IV. Self - Help Skills

A. Toilet Habits: Trained yes___ no___ age_____
Partially trained yes___ no___ describe
Enuresis yes___ no___ frequency
Other comments
Problems

B. Undressing - Dressing
Removes articles of clothing yes___ no___
Describe
Puts on articles – Describe
Buttons_____ unbuttons____ zips___ ties____

C. Eating Skills -
Feeding method:
Describe: i.e. Needs help

Problems
Nutrition - general for family - delete if nutrition evaluation is to be done.

D. General Care
Bath
Oral hygiene
Other

V. Child Rearing Practices

A. Discipline - Method (s) observed

Who makes decision about ________?
How do you get your children to mind?
What are some of the rules around the house?

B. Other Factors
Who assumes responsibility for _________ when mother is not at home?
Other

VI. ***Play and Activity***

A. Play - where with whom type

Describe play behavior

Favorite toys

B. Activities of Day - brief

VII. ***Sleep:*** ***Bedtime*** ***Arises***

Where

Restless

Problems

VIII. ***Medications:*** ***What*** ***Dosage*** ***Time***

Where kept:

Given appropriately:

IX. ***Recent Learning:***

X. ***Other Pertinent Data -***

Referrals made -

Health of family members

other

XI. ***Summary and Conclusions***

A. Safety and adequacy of home

B. Family members and patient summary

C. Briefly describe child at home

D. Self-help functioning - approximate level

E. Summarize child rearing practice and disciplinary measures, etc.

F. Other conclusions

XII. ***Recommendations:***

Coding Considerations:

The nurse participates in the team conference and submits her recommendations for consideration. Some follow-up is provided. Nursing students participate in the follow-up care and frequently seek the consultation of nutritionists in providing care; and indeed, we consider the nutritionist one of our stronger allies in terms of planning family care.

Relationships can be described and roles defined in many ways in planning with families; however, it is felt that nursing and nutrition have and should have very close alliance in this undertaking.

James R. McCann, Ph.D.[*]

RELATIONSHIP OF PSYCHOLOGY TO NUTRITION

Psychology generally defines its subject matter as the study of human behavior, and it has long recognized that one of the most basic yet complicated acts of the human subject is related to hunger and eating. It has been found with prolonged deprivation that thoughts of food come to dominate consciousness even to the exclusion of other pleasurable pastimes that may occupy man's fantasy life. It appears that the investigation of nutritional problems and eating behavior would lend itself to a team approach. Here we shall consider some of the ways in which the nutritionist and the psychologist might work together to modify food preferences and eating behavior.

There are a number of factors that interact and influence eating behavior that are of particular interest to psychology. One such factor is the child's basic level of general intelligence. The psychologist has at his disposal a number of objective instruments designed to assess this characteristic of the individual. Although all such testing devices leave much to be desired, certain of the individual tests are relatively valid and will enable the psychologist to provide the nutritionist with valuable information concerning the individual's ability to utilize information and profit from nutrition counseling. Some may respond to intellectual persuasion and social reinforcements while others may require more basic rewards to change behavior, such as a token or a toy when certain foods are eaten in a particular way. Because of his level of intellectual development we may need to resort to something as elementary as removing the child from the table when his eating behavior is unacceptable.

In addition to intellectual factors, the psychologist may also be able to cast some light on emotional or personality characteristics that will influence eating behavior. Although the severe types of emotional disturbances related to eating, such as anorexia nervosa (loss of appetite of psychogenic origin) or bulimia (morbid hunger unrelated to frequency of eating), are relatively rare, problems of malnutrition and poor food habits with emotional overtones are not uncommon. In many cases food comes to be associated with security, and when certain individuals are under pressure their food intake increases accordingly. If we are able to identify and deal with personality and emotional factors the related eating problems may take care of themselves with only a minimum amount of assistance. In such cases the undesirable eating behavior may be a symptom of some more basic personality problem.

Learning is a central concept in explaining man's behavior. We not only learn ways of responding but we also learn preferences. This becomes evident to the nutritionist during her evaluation. In many instances we need to unlearn earlier established likes or dislikes; we need to eliminate certain responses while replacing them with more appropriate ones. The nutritionist may be able to determine desirable or necessary changes in the eating behavior of the child, and the psychologist may assist in the application of behavior shaping techniques to produce such behavioral changes. By working together they not only improve eating behavior but even modify food preferences.

Although frequently neglected as a technique of behavior modification, one of the most pervasive approaches of the child is ***imitation.*** Children imitate parents and peers and other significant people in their lives, such as teachers and counselors. Frequently the child may imitate to gain approval, and such praise and approval is very effective in sustaining the imitative behavior once it has occurred. Anything that will sustain the behavior or increase the possibility of its recurrence is said to be a ***reinforcement.*** There are vast individual differences in reinforcers; what is a reinforcement for one child may not be for the next. It is essential that the nutritionist and the psychologist discover a proper reinforcer if this approach is to be effective. Working together they may come up with some very unexpected and ingenious way in which the new behavior is rewarded. The psychologist will often use candy as a reward to help the child learn certain activities, but when we are attempting to change eating patterns this reinforcer may be the very thing we are attempting to eliminate! Instead we may need to use tokens that can be exchanged for toys or priviledges, we may use praise and approval, we may let the desired behavior lead to sensory stimulation involving pictures or music. The range of possible reinforcers is almost unlimited; the problem is to discover what is suitable for ***this*** child. We cannot assume that because something is reinforcing for us it will have a similar effect for this particular person. We must first test it out, and we must also determine a way to measure and control the dispensation of the reinforcer. The psychologist may be particularly helpful in designing a way to do this and also in determining a technique to measure change in behavior.

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What causes behavior? Although in the human, with his highly developed nervous system and capacity for learning, this may become very complex and refined, it is still possible to reduce this down to energy level. To behave the person must have a certain amount of fuel or energy, and this fuel comes from the food we eat. Nutrition is in a position to evaluate this source of energy and help us to know what to expect in terms of the subject's vigor and ability to stay at a task. The changes in diet recommended by nutrition may make the child more alert and better able to respond so that we can work together toward modifying his behavior.

Hunger and eating behavior in the human are very complex. This appears to be a basic biological need that quickly becomes overshadowed by learning and the processes of socialization. It may even be more accurate to classify hunger as a social need rather than a biological one. This becomes evident when we try to explain not only what we eat but when and where and how we eat it. Certain learned preferences may become so strong that we would literally starve to death before eating particular foods that are readily available. A delicacy in one culture is considered inedible in another!

The investigation of something that appears as simple and direct as hunger and eating does in fact turn out to be a complex act and a proper place for a truly interdisciplinary team effort.

Dolores Henderson, M.C.D. *

RELATIONSHIP OF SPEECH PATHOLOGY TO NUTRITION**

Before one may be cognizant of the role of the speech pathologist in an interdisciplinary center for developmental disorders of children, he must first realize functions of this profession in general. The profession of speech pathology incorporates study and concern in prevention, diagnosis, treatment and ongoing research of communication disorders in children and adults. As in many other disciplines, there are numerous specialities and subspecialities the speech pathologist may pursue. As one of the professions represented and involved in an interdisciplinary center, the speech pathologist has an unique and versatile role. Such a role includes: diagnosis of communication disorders; providing or recommending treatment if indicated; informing and counseling parents in reference to speech and language disorders; serving as consultant to other disciplines where deemed appropriate; and participating in collaborative research with respect to children who present developmental disorders.

One realization which became apparent from working in an interdisciplinary program for children was the presence of some similarities in the background, training and services offered by various disciplines. Such a realization was not uncommon to the disciplines of nutrition and speech pathology. There appeared to be some common goals and interests in three major functions of these professions: diagnosis, treatment and management, and research of developmental disorders of children. The purpose of this paper was to describe some of these relationships.

Initially, the speech pathologist may act as referrer to the nutritionist or vice versa. One particular disorder, histidinemia, may serve as illustration. Histidinemia is an inborn error of metabolism first reported in 1961 by Ghadimi, et al. (2). Children with histidinemia sometimes do not exhibit any clinical manifestations; however, a speech and language disorder appears to be the most consistent finding of those cases reported. Although a definite causative relationship between the speech and language problems and the biochemical changes is not established, some researchers (4, 7) suggested that patients with speech and language disorders be screened for this condition. Likewise no definite dietary treatment, as with PKU, is designed; however, modifications may be made by follow-up with the nutritionist. Therefore, it appears important for the speech pathologist to refer children for nutritional evaluation when a child exhibits speech and language deficits as described by Witkop and Henry (7), and there is no apparent etiology for the disorders. Other instances where referral of one discipline to the other for evaluation might be indicated would be children with congenital anomalies such as cleft lip and palate, and children who manifest neuromotor involvement of the upper extremities and trunk. These children frequently exhibit feeding difficulties as well as deficits in speech and language.

After a child is referred and subsequently seen for diagnostic evaluation in nutrition or speech pathology, one soon becomes aware of some related goals and interests of these two disciplines in the evaluation process. The purpose of the nutrition evaluation as described by one of my colleagues is to evaluate the nutritional status of the child through assessment of (a) prenatal nutritional status of the mother; (b) physical status of the child in terms of height and weight; (c) adequacy of diet; and (d) feeding development and practices including assessment of any mechanical feeding problems such as chewing, sucking, swallowing. In contrast, the purpose of the speech and language evaluation is to assess the child's level of functioning regarding speech and language skills. There are four major areas of primary concern: (a) receptive and expressive language abilities; (b) speech functions including articulation, resonance and fluency; (c) structure and function of the intra-oral speech mechanism including tongue, teeth, lips, hard palate, velum; and (d) auditory functions, both acuity and perception. Although for different reasons, both the nutritionist and speech pathologist are concerned in the evaluation with assessment of structure and function of the oral mechanism. The nutritionist is concerned with appropriate feeding skills including abilities of chewing, sucking, swallowing, so the child can eat foods necessary for an adequate diet. Motor patterns for these functions are generally present at birth and those for mastication appear when semi-solid foods are introduced in the diet. If there is deviation of the structure or function of the mechanism at the vegetative level, the child's overall nutritional status may be affected. A basic principle learned early in the speech pathology curriculum is that speech is an overlaid process. Those structures utilized for speech are the same structures used for the more basic functions of breathing, sucking, mastication and deglutition. In additional to adequate performance of the oral mechanism for vegetative purposes, the child must be able to accomplish voluntary movements of the same structures and perform these rapidly for normal speech and language. It is important in the diagnostic evaluation for the nutritionist to assess structure and function of the intra-oral mechanism at the vegetative level while the speech pathologist must look at the same mechanism at the voluntary level. Adequate assessment is necessary at both levels before proper management and treatment can be recommended.

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Several ideas or problems were mentioned in the preceding paragraphs which suggested areas of treatment and management where the speech pathologist and nutritionist may be closely allied. For example, nutritionists as well as occupational and physical therapists can and have offered valuable information regarding techniques and procedures for developing adequate vegetative functioning of the speech mechanism. Until the child accomplishes such skills on a vegetative level, he cannot be expected to perform adequately in speech. Many techniques utilized in speech therapy for gaining voluntary control of the articulators are but extentions of those methods utilized by the physical, occupational therapists and nutritionists for developing adequate feeding skills. These procedures are used frequently with children who exhibit neuromotor disorders. Such methods and programs are described by Westlake and Rutherford in their book ***Speech Therapy for the Cerebral Palsied*** (6). The child with cleft lip and palate also may utilize the collaborative services of nutrition and speech pathology. Frequently, children with these congenital anomalies exhibit feeding difficulties from birth and fail to develop speech and language skills normally. Clinical experience indicates that if prosthodontic feeding appliances are inserted in early infancy not only will the feeding problems of these children be decreased but the appliance may facilitate prelinguistic stages of speech and language development. By the nutritionist and speech pathologist working together in conjunction with appropriate disciplines, the child who exhibits multiple problems has a better prognosis for normalization.

In the final consideration, research is needed to identify further relationships of speech pathology and nutrition. At the present time, the majority of children who manifest speech and language disorders do not have an identifiable etiology for these problems. As is suggested in histidinemia, metabolic disturbances or biochemical defects may be found to be underlying causes for some of these disorders. If further investigation confirms such a relationship, dietary management may become a preventive measure of some of these disorders or an effective form of treatment. In addition, some authors (1) note that both the nutritional status of the mother during pregnancy as well as the nutritional status of the child is important to the child's normal growth and development including speech and language. Animal research (3, 5) also suggests that some congenital anomalies such as isolated cleft palate can be produced by dietary measures. Therefore, one might speculate that adequate nutrition on the part of the mother and child may prevent some speech and language disorders. Questions which should be considered for research include: (a) Do some speech and language disorders have biochemical bases? (b) What is the relationship of the nutritional status of the mother and child to speech and language development? Only through collaborative research of various disciplines including speech pathology and nutrition can such relationships be confirmed or denied.

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THE RECOMMENDED DIETARY ALLOWANCES – APPLICATION AND IMPLICATIONS **

The seventh revision of the Recommended Dietary Allowances (RDA) by the Food and Nutrition Board of the National Research Council was published last year (1).

RDA Changes: RDA are given for the first time for seven nutrients; vitamin E, folacin, vitamin B_6, vitamin B_{12}, phosphorus, magnesium and iodine. There are changes in the age groups also. RDA are given separately for males and females from age ten years onward. A new age category for those age eighteen to twenty-two years has been added. And infants are now tabulated in three groups: from birth to two months; two to six months; and six months to one year.

The above nutrients have been added to the RDA tables because they are believed to be essential and should be adequately provided in the daily diet. The Board felt that there was sufficient experimental data on which to base recommendations.

Vitamin E deficiency may occur in infants. Human milk is relatively rich and cow's milk relatively low in vitamin E. The requirement increases as the intake of fat and of polyunsaturated fats increases. Vitamin E aids in the prevention of hemolysis; and there is a relationship between vitamin E and selenium.

Folacin deficiency may arise from inadequate dietary intake, impaired absorption or excessive demands by body tissues and metabolic derangements. The infants allowance is given as 0.05 mg per day and for adults 0.4 mg. Results of deficiency include megaloblastic anemia, glossitis and diarrhea.

Vitamin B_{12} allowance is given as 1.0 microgram for infants up to 2 months increasing to 2.0 mcg for the one to two year old and up to 5.0 mcg for adults. Much more information is needed about the requirements for vitamin B_{12}. Intrinsic factor, a mucoprotein secreted by the stomach, is necessary for absorption of vitamin B_{12} taken orally.

Vitamin B_6, the generic name for pyridoxine, pyridoxal and pyridoxamine, may be low in human milk, but cow's milk and commercially prepared baby foods have adequate amounts, at least in proportion to the protein present. A major function of B_6 is in relation to protein and amino acid metabolism. RDA is 0.2 mg for the two-month infant and 2.0 mg for adults.

Magnesium has a major role in the activation of many enzymes. The RDA is from 40 mg for the two-month infant increasing to 400 mg per day for adult males.

Iodine has long been recognized as a dietary essential for the normal function of the thyroid gland and prevention of simple goiter. The RDA for young infants is 25 mcg and increases to 140 mcg per day for the adult. Food sources of iodine are uncertain because the iodine may have been leached from the soil; therefore, the nationwide use of iodized salt is strongly recommended. The need for an educational program for the public on the selection of iodized salt is indicated by the current reports (2) of the findings of enlarged thyroid in 5 percent of the population sample..

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**** Presented at Nutrition Workshop, Child Development Center, June, 1969**

Recommendations For Adults. These have not been markedly changed. It is important to note that calories are again lowered for the adult and the RDA is now 2800 and 2000 kilocalories respectively for the man and woman of 18 to 22 years of age. The device of the "reference" man and woman (adopted by the Board in 1958) continues to be used. The "reference" adult is 22 years of age and 154 lb (man) and 128 lb (woman).

Indications are that the fat intake of U.S. diets is too high and there are some data which indicate that requirements for essential fatty acids is relatively low. Data are inadequate to make any recommendations as to the total fat of the diet or the proportion of linoleic acid.

Carbohydrate should be at least 100 gm per day to avoid ketosis on a normal mixed diet. Protein formerly 1 gm per kilo of body weight is now recommended as 0.9 gm per kilo. Protein RDA is decreased.

For the first time since the RDA were presented in 1941 there is marked change in the RDA for ascorbic acid; it has been lowered by 15 mg and is now 60 mg for the adult man and 55 mg for a woman.

The RDA for iron for the woman from 18 to 55 years is the highest level ever recommended by the NRC, it is 18 mg per day. It has been lowered for the male from 12 mg to 10 mg per day. There are problems in reaching an intake of 18 mg of iron since an otherwise adequate diet usually contains no more than 6 mg per 1000 kcal. And the calorie intake for the reference woman is recommended to be 2000 kcal. More information is needed on the absorption of iron, its availability in food and the desirability of iron fortification of foods. If certain articles of diet are to be fortified with iron more data are needed on the most desirable from of iron salts.

RDA For Children. For infants and children the major changes in recommendations are for ascorbic acid, iron, protein and calcium. For infants under one year the ascorbic acid RDA is increased to 35 mg, and from one year of age up to 12 years it is 40 mg (this is lower than previously recommended). The iron RDA is increased for infants and young children; levels of 15 mg per day for the one year old will not ordinarily be met without the use of iron-fortified foods. The implications are especially serious in the case of needy families.

A lower RDA for protein is given for infants and children; this has been decreased through the years and now is markedly lower than in the first recommendations of 1941. Calcium is considerably lower for the infant under one year and slightly lower than previously until 12 years of age. Phosphorus is included in the tables for the first time and the emphasis is on the ratio of calcium to phosphorus. In early infancy Ca:P should be 2:1 which is the ratio found in human milk; for older infants the phosphorus is raised to about 80 percent of the calcium allowance and this is similar to cow's milk.

Use Of NRC Recommendations. In using the RDA or any part of the recommendations of the Food and Nutrition Board the purposes and plan of the recommendations should be clearly understood. The text and tabular material should be used together; the table of RDA should not be used without full understanding of the background data on which the figures are based and the implications of these.

The RDA are not intended as a yardstick for measuring the adequacy of diets of individuals. They are formulations of daily nutrient intakes judged to be adequate for the maintenance of good nutrition in practically all healthy persons in the U.S. With the exception of calories, the allowances provide a margin of safety for individual variations; they are allowances not requirements.

Food Is What We Eat. Food is what the individual eats rather than nutrients. The dietitians and nutritionists are challenged to interpret the RDA in practical terms of food and meals for individuals and families. In choice of food, nutritive value is not the only factor, food must be acceptable and enjoyed by the individual and this is influenced by economic, ethnic, cultural and regional customs and food patterns. Educational programs are needed at all levels particularly in how to buy food and how to make the best purchases on a limited budget. Where and how to get food help for low-income families is a responsibility of the nutritionist. Special attention needs to be given to availability and use of iodized salt and to practical ways of meeting the RDA for iron.

Nutrient Requirements Of The Retarded and Handicapped. The RDA are planned for the nutritional needs of a healthy population. They are based on research studies.

There is very little information or research on the nutrient requirements of the retarded and handicapped available at present; there is a great need for such research. A few studies are beginning to be reported on nutrition in the mentally retarded, particularly in mongolism. Inborn errors of metabolism in children with mental retardation are being studied and some success is being achieved in some cases where the metabolic defects are identified early enough.

Research as yet has shown no evidence of a higher need or different requirement of nutrients for those retarded in growth and development, except where there are inborn errors of a type that can be influenced by diet. Until there is more research we must proceed on the assumption that these children have the same nutrient requirements as other children. The problem is that each child is an individual with his own metabolism and needs, and superimposed on this are other difficulties. Calorie requirement is primary; without adequate calories sufficient intake of other nutrients is difficult and it should be remembered that protein will be utilized as calories unless these are met otherwise. The handicapped or retarded child may have difficulty in learning the neuromuscular processes of sucking, swallowing and chewing. The difficulties of handling food lead to weariness and inadequate intake of calories and accompanying nutrients. Calories for maintenance, growth and activity need to be studied along with nutrient requirements and ways these are modified by the specific disorder and its accompanying problems of feeding behavior.

The RDA of the National Research Council can serve as a guide only, until more specific information is available on the needs of the retarded and handicapped.

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Helen K. Berry, M. S. *

NEWER KNOWLEDGE OF INBORN ERRORS OF METABOLISM, **, ***

The term " inborn errors of metabolism" was coined in 1908 by Garrod when he described four conditions, alkaptonuria, albinism, cystinuria and pentosuria (1). He noted these conditions occurred in families. Often several siblings were affected but not parents or other relatives. There was a high frequency of consanguinity among parents. He realized these conditions fit the concept of recessive inheritance recently described by Gregor Mendel. He developed the concept that these conditions occurred because an enzyme controlling a particular step in a metabolic reaction was missing. Nearly 50 years passed before the validity of his concept was demonstrated by the finding of an absence of homogentisic acid oxidase activity in liver tissues from a patient with alkaptonuria (2).

It was not until the introduction of paper chromatographic techniques in the 1940's and automatic column chromatography in the 1950's, by means of which it became possible to examine specimens of blood and urine from large numbers of individuals, that the great variety of abnormalities of amino acid, carbohydrate and other metabolic systems were recognized. Most of these conditions are rare but are of significance because, in many instances, they lead to death, disease or mental retardation. Recognition is important because in some instances therapeutic measures may mitigate the pathological consequences. Even if no therapy is available, knowledge of the genetic character of the biochemical disorder can be helpful in management of the affected child and in counselling of parents and siblings.

This presentation is not meant to be a comprehensive review. New disorders are reported frequently, and many are represented by a single case. Those inborn errors of metabolism which occur with some frequency among the mentally retarded population will be discussed.

Two inborn errors of metabolism, galactosemia and phenylketonuria, stand above the rest in significance because it has been demonstrated that mental retardation can be prevented by early diagnosis and appropriate treatment. Mass screening techniques for detection of these disorders are now being carried out on large segments of the newborn population.

Homocystinuria

Homocystinuria was described first in mentally retarded siblings with characteristic features of sparse, fine hair, red mottling of the skin and dislocation of the lens (3). Long, thin extremities and digits resembling those of patients with Marfan's syndrome are found frequently, and patients show a tendency to thromboses.

More than half of patients described have mild to moderate mental retardation (4). Dislocation of the lens almost always occurs and the skeletal abnormalities are frequent. Arterial and venous thrombosis may occur at any time from infancy on. Characteristic biochemical abnormalities include elevation of methionine and homocystine in blood and cerebrospinal fluid, and excretion of homocystine in urine together with mixed disulfide of homocystine and cystine (5). The biochemical defect consists of a deficiency of the enzyme, cystathionine synthetase, which catalyzes the reaction in which methionine, as S-adenosylmethionine, normally is converted to homocystine and adenosine. Homocystine is then condensed with serine to cystathionine. The condensing enzyme is absent or deficient in livers from patients with homocystinuria (6). Treatment has been directed toward limiting the methionine content of the diet and providing a cystine supplement (7). Cystine is an essential amino acid for patients with homocystinuria since it can no longer be derived from methionine. Pyridoxine supplement also appears to be useful (8).

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Hyperglycinemia

At least two forms of hyperglycinemia have been recognized (9, 10). The first is characterized by metabolic acidosis, respiratory distress and, frequently, early death. Children who survive develop hematologic abnormalities and osteoporosis. In the second type, acidosis and ketosis are not present, but presenting symptoms include seizures beginning early in infancy, hypotonicity, disease of the central nervous system and early death or severe developmental retardation. The specific enzymatic defect has not been identified, although studies by Nyhan suggest that failure of conversion of glycine to glyoxalate may be responsible (11). In some patients, rapid conversion of glycine to serine appears to be defective (12). The pathways for incorporation of glycine into the porphyrin nucleus, purines, glutathionine, creatine and proteins appear to be normal (9). Restricted protein intake is helpful in treatment of children with the ketotic form of hyperglycinemia and may be essential to control ketosis and acidosis. Recently, in several patients, it was shown that methylmalonic acid in blood and urine was associated with acidosis and hyperglycinemia, further complicating the picture (13). Large doses of vitamin B_{12}, up to 1 mg/day did not improve the acidosis in these patients.

We have studied four patients with the non-ketotic type of hyperglycinemia, two girls, first cousins and two unrelated boys. They had common symptoms of seizures beginning early in life, usually during the first week, coma, dehydration and severe developmental retardation. Glycine excretion ranged from 800 to 3000 mg/day compared to normal excretion of 11 to 42 mg/day. Plasma glycine levels ranged from 2.5 to 10 mg/100 ml, compared to a normal range of 1.2 to 1.9 mg/100 ml. A low protein diet based on natural foods together with increased fluids produced decreases in blood glycine levels to approximately twice normal and a reduction in urinary excretion from 100 to 10 times normal. Although the neurologic damage was irreversible, there was improvement of seizure control and decreased frequency of episodes of coma and dehydration.

Maple Syrup Urine Disease

Clinical symptoms of maple syrup urine disease are usually apparent during the first week of life, consisting of loss of reflexes, alternating rigidity and flaccidity, coma, convulsions and respiratory difficulties (14). Death may occur during the first weeks of life. Less severely affected patients may be retarded. The name is derived from the unusual sweet odor of the urine. Biochemical characteristics consist of elevation of leucine, isoleucine and valine in plasma and cerebrospinal fluid and excretion in the urine of both branch chain amino acids and the corresponding keto acids. Leucine concentration is usually much greater than that of isoleucine or valine. Transamination of the branch chain amino acids to the keto acids occurs normally, but decarboxylation of the keto acid is blocked. Treatment to reduce the content of all three amino acids in the diet has permitted correction of the biochemical abnormalities and normal development (15). The diet is usually based on an amino acid mixture together with gelatin, egg yolk, carbohydrate, minerals and vitamins.

Tyrosinosis

Tyrosinosis is a hereditary disorder characterized by cirrhosis, severe hypophosphatemia, rickets, renal tubular defects and derangement in tyrosine metabolism (16). Biochemical features include elevated concentration of tyrosine in blood of 5 to 20 mg/100 ml, excretion of tyrosine and its metabolites, para-hydroxyphenylpyruvic acid, para-hydroxyphenyllactic acid and para-hydroxyphenylacetic acid. Methionine and phenylalanine concentrations in blood may also be increased above normal. There is a generalized aminoaciduria, mellituria and proteinuria. Use of a diet low in both tyrosine and phenylalanine was associated with reduction in concentration of tyrosine in serum and decrease in excretion of tyrosine metabolites (17). Some clinical improvement has been reported provided treatment was begun before liver disease was too far advanced. A deficiency of the enzyme para-hydroxyphenylpyruvic acid oxidase has been demonstrated (18). Administration of ascorbic acid has no effect on the biochemical abnormalities, in contrast to its effect in reversing the inhibition of this same enzyme in tyrosinemia of prematurity.

Disorders of the Urea Cycle

Several disorders have been described involving abnormalities in the pathways of degradation of amino acids to ammonia and its elimination as urea. Most of these are associated with elevated blood ammonia, particularly after ingestion of protein. Patients are usually moderately or severely retarded with seizures and ataxia.

Two patients, both retarded, have been described with citrullinemia (19, 20). A deficiency of Argininosuccinic acid synthetase was demonstrated in liver biopsy specimen from one patient and in fibroblast cultures from the other patient (21).

At least 12 patients have been described with argininosucciniaciduria (22). Clinical features, besides excretion of the amino acid, include mental retardation, ataxia, seizures, liver dysfunction and abnormalities of hair structure. The defect leading to excretion of 2 - 3 grams per day of argininosuccinic acid has been shown to be absence of argininosuccinase, one of the enzymes in the urea cycle which effects the breakdown of argininosuccinic acid to arginine and fumaric acid (23). The enzyme has been found in liver tissue and in erythrocytes. There are no reports of long term treatment of these disorders. Proposed therapy consists of a low protein diet to control blood ammonia levels. For patients with argininosucciniaciduria, arginine may be an essential amino acid.

Histidinemia

No specific clinical characteristics are associated with histidinemia other than a high frequency of speech defects. About half the 25 patients reported show mild to moderate mental retardation (24). The disorder was first recognized as a result of screening for detection of phenylketonuria. Urine specimens gave a positive reaction with ferric chloride similar to that obtained with phenylpyruvic acid. The substance was identified as imidazole pyruvic acid. Other biochemical features include elevation of histidine in plasma and increased excretion of histidine and its metabolites, imidazolepyruvic acid, imidazole lactic acid and imidazole acetic acid.

The defect has been shown to be absence or deficiency of histidase, the enzyme which brings about deamination of histidine to urocanic acid (25).

We recently studied a family in which three siblings, their mother, two maternal aunts and two cousins have histidinemia (26). The family came to our attention because of a speech defect in the youngest child, age seven. The three affected children all have marked language deficits, particularly inability to repeat a series of numbers or words. Deficiency of skin histidase was demonstrated and histidine loading tests were abnormal. In this family the abnormality seemed to be inherited as a dominant trait.

No treatment has been proposed because it has not been clearly demonstrated that the biochemical defect leads to clinical abnormality. It is possible that the mild deficits are related to an excess of histidine in the blood during the period in infancy when histidine is an essential amino acid.

Hyperuricemia

Hyperuricemia is an unusual disorder characterized by mental retardation, athetoid cerebral palsy and self mutilation (27). Older children may develop symptoms of gout with deposition of tophi and urinary tract involvement with hematuria and calculi. Uric acid is the end product of purine metabolism, whether dietary in origin or derived from nucleic acids. In children with hyperuricemia, the enzyme which promotes the conversion of hypoxanthine and guanine to their respective nucleotides is deficient (28). The products of this reaction normally control the formation of purine nucleotides by feedback inhibition, so that in the absence of the enzyme, purine production and, consequently, uric acid production proceed unchecked. Serum uric acid is elevated and urinary excretion of uric acid is excessive. Purine free diet is used to reduce as much as possible exogenous sources of uric acid. Since uric acid is derived from simple compounds such as glycine and glutamine, dietary treatment is not particularly helpful. Allopurinol, a drug used in treatment of gout, has been effective in reducing uric acid concentrations of urine and blood, but there is no evidence that the mental retardation can be prevented by this means.

Galactosemia

Galactosemia is an inherited metabolic disorder characterized by the failure to convert galactose, derived from lactose, or milk sugar, to glucose (29). The enzyme, galactose-1-phosphate uridyl transferase, which catalyzes the transfer of phosphate from galactose to glucose, is deficient in galactosemic infants. Principle steps in the reactions are shown below:

1. Galactose + Phosphate (inorganic) → Galactose-1-Phosphate (Gal-1-P)
2. Gal-1-P + Uridine Diphosphoglucose (UDPG) → UDP-Galactose + Glucose-1-Phosphate.

Reaction 2 is blocked in galactosemic individuals and galactose -1-Phosphate accumulates. Other biochemical abnormalities include accumulation of galactose in blood and tissues, excretion of galactose in urine, decreased blood glucose leading to hypoglycemia and coagulation difficulties. In untreated infants clinical symptoms of jaundice, hepatomegaly and cataract formation may be apparent within the first few days of life. Death may occur within the first week to month of life; sepsis, hemorrhage or liver cirrhosis are frequent causes of death. Most untreated children who survive infancy show progressive mental retardation and growth retardation.

Treatment with a diet free of galactose and galactose sources produces a dramatic response in improvement of all clinical symptoms. If treatment is begun early enough cataracts will recede. Galactose restriction is recommended for female carriers during pregnancy. Diagnosis can be made on cord blood so an affected sibling of a known galactosemic may be treated immediately after birth. Measurement of galactose-1-phosphate accumulation in red cells is the preferred means of monitoring the efficiency of galactose restriction.

Phenylketonuria

Phenylketonuria is the best studied example of an inherited metabolic disorder. Normally 80% of phenylalanine in the diet is converted to tyrosine by phenylalanine hydroxylase, a liver enzyme. In phenylketonuric individuals this enzyme is missing or inactive and phenylalanine accumulates in blood in amounts 10 to 50 times normal. Phenylalanine and its metabolites overflow into the urine and may be found in sweat. Treatment of phenylketonuria with a diet low in phenylalanine has been effective in preventing or minimizing the mental retardation, neurological abnormalities and other associated symptoms. The Cincinnati phenylketonuria treatment program began in 1956. Our first patients were 3½ to 4½ years old. While there was improvement in behavior and ease of management, there were no changes in intellectual abilities (30). It became apparent that the mental retardation could not be reversed, but might be prevented. Screening programs, based at first on urinary metabolites and later on blood phenylalanine, were effective in detecting the biochemical disorder prior to development of any clinical symptoms. Our first phenylketonuric infant, six weeks of age, was found in a urine screening program in 1961 (31). At present, 16 children in whom the diagnosis of phenylketonuria was made before three months of age are under treatment in our Clinic. They range in age from one year to eight and one-half years. Our concept of treatment of phenylketonuria was based on the assumption that both height and weight should proceed normally. Over the years the goal of normal growth as well as normal intelligence has guided our treatment program and has led to the liberalized dietary regimen which is described below.

In 1966, we reported the results of treatment of phenylketonuric children over a ten year period (32). Eight children treated prior to three months of age had normal intelligence with IQ scores over 100, together with normal growth and absence of neurological abnormalities. We noted periods of minor growth lag, especially in height. While these mild growth deficits were not necessarily cause for concern among older children who had been treated for four to six years, the trend toward decreasing growth rate was more pronounced and was reflected in a progressive decrease in percentile ratings of cortical thickness. This radiological parameter is useful as an index of nutritional adequacy (33). These observations prompted a thorough evaluation of nutritional data which had been collected. Records of the total dietary intake of the patients were available throughout the entire period of treatment, over seven years for some children. From these records the daily intakes of phenylalanine, total protein and calories, both from Lofenalac and from natural foods, were calculated. Up to 30 months of age each month's records were averaged. Beginning at one year quarterly averages were computed. Growth was plotted in terms of standard deviations from the mean in order to detect periods of inconstant growth. After making preliminary graphs of the data, it was clear that there was a need for some standard against which to measure Lofenalac intake, caloric intake and supplementary phenylalanine intake from natural foods.

The protein allowances for infants and children recommended by the National Academy of Sciences-National Research Council were used as a guide to calculate recommended Lofenalac intakes at different ages, assuming the protein to come from Lofenalac alone (34). The amount of Lofenalac in the diet was plotted together with the recommended intake. Caloric allowances were taken from the same source and data were similarly plotted for the first 30 months only.

Holt reported estimated phenylalanine requirements for phenylketonuric children ranging from 70 to 90 mg/kg at one month of age to 35 mg/kg at two years (35). He found that phenylalanine requirements of phenylketonuric infants and normal infants of the same age were of comparable magnitude. Nakagawa reported a requirement of 27 mg/kg for normal children 10 to 12 years of age (36). There are no data on amino acid requirements for children between 2 and 10 years of age. The requirements from Holt were used as guidelines for recommended phenylalanine intakes up to 2 years of age. The value of 25 mg/kg was used for children 10 years of age. The phenylalanine requirement for the period between 2 and 10 years of age was estimated to be between 35 and 25 mg/kg and was arbitrarily set at 30 mg/kg. Values for total phenylalanine based on mean weights were calculated from the above requirements. Data for total phenylalanine in the diet of each child were then plotted. A requirement for phenylalanine from natural foods was obtained by subtracting the phenylalanine content of the recommended amount of Lofenalac at a given age from the total calculated requirement. The data for supplemental phenylalanine from natural foods were plotted together with the estimated requirement for supplemental phenylalanine. The required intakes of Lofenalac calculated from the recommended protein allowances at different ages are shown in Tables 1 and 2. Table 3 shows the calculated amount of supplemental phenylalanine required.

Serum phenylalanine determinations were usually made at weekly intervals during the first six months of life. Weekly determinations were continued in frequent elevations of serum phenylalanine had occurred. If the desired degree of control had been achieved, the frequency of serum phenylalanine determinations was decreased to semi-monthly or monthly after six months. During the first year of life, the serum phenylalanine values on the graph represented monthly averages or approximately four determinations. After one year of age the serum phenylalanine values on the graphs represent one or two determinations up to 30 months. On the scale from one to eight years the serum phenylalanine values represent at least three determinations.

Graphs from one patient will illustrate how the data were assessed. (Figs. 1 and 2). Treatment consisting of Lofenalac alone was started elsewhere at 2 weeks of age. Only a small amount of formula was taken. Weight dropped sharply; height was slower to decline, but by three months of age growth had ceased. The child was listless, vomited and was severely anemic. At three months one ounce of milk was added to the diet, but no clinical changes were noted. At five months of age the child was referred to us for dietary regulation. Supplemental phenylalanine was added to the diet; gradually more Lofenalac was taken. Weight gain was noted immediately when the diet was improved, but recovery in height was slower. Serum phenylalanine levels ranged from 2 to 14 with very little change in average phenylalanine intake. Increases or decreases made in response to serum phenylalanine levels were not always appropriate. From three years to six years there was a steady decline in rate of gain in height and weight, coinciding with a decrease in Lofenalac intake. Efforts to increase the amount of Lofenalac in the diet were not successful. Following an increase in supplementary phenylalanine at six years of age Lofenalac intake increased and weight and height rates recovered. Throughout this time there were no particular changes in blood phenylalanine levels to suggest to us that the diet was inadequate. When the phenylalanine intake from supplemental foods was increased, only small changes were seen in blood phenylalanine levels. In examining graphs of other children, a frequent finding was an increase in blood phenylalanine levels coincident with a decrease in Lofenalac intake, when no changes were made in the phenylalanine derived from natural foods. Weight and height usually fell at the same time. Attempts to increase Lofenalac intake often were not successful.

Table 1

Recommended Intake of Lofenalac
Based on Protein Requirements*

Age (years)	Protein Requirement g/kg/day	Lofenalac T/kg/day	Lofenalac (Based on Avg. Wt.) T/day
0-1	2.5	1.8	18
2	2.5	1.8	22
3	2.4	1.7	24
4	2.2	1.6	26
5	2.2	1.6	29
6	2.2	1.6	33
7	2.2	1.6	37
8	2.2	1.6	41
9	2.0	1.4	42
10	1.8	1.3	43

Table 2

Recommended Intake of Lofenalac to
Meet Protein Requirement of 2.5 kg/day

Age	T/day
Birth	6.3
2 weeks	7.0
1 month	7.5
2 months	9.0
3 months	10.5
4 months	11.5
5 months	13.0
6 months	14.0
7-8 months	15.0
9 months	16.0
10-11 months	17.0
12 months	18.0
18 months	20.0
24 months	22.0

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* ________. 1963. Recommended Dietary Allowances. Food and Nutrition Board. National Research Council. National Academy of Sciences. Washington, D.C.

Table 3

Relation of Total Phenylalanine Requirement to Supplemental Phenylalanine Requirement

	Phenylalanine Intake		Supplemental Phenylalanine	
Age	Total mg/day	From Lofenalac mg/day	mg/day*	mg/T Lofenalac
1 mo	290	50	240	37
1 mo	315	55	265	35
2	350	65	285	32
3	385	80	305	29
4	390	90	300	26
5	390	95	295	23
6	390	105	285	20
7	385	110	275	18
8	390	115	275	18
9	365	120	245	15
10	360	125	235	14
11	360	130	230	13
12	350	135	215	12
15 mo	375	140	235	12
18	400	150	250	12
21	420	155	265	13
24	440	165	275	13
30 mo	475	170	305	13
36	475	180	295	12
42 mo	510	185	325	13
48	540	195	345	13
54 mo	570	205	365	13
60	580	215	365	13
6 yr	640	250	390	12
7 yr	650	275	375	10
8 yr	680	310	370	9
9 yr	755	315	440	10
10 yr	825	325	500	11

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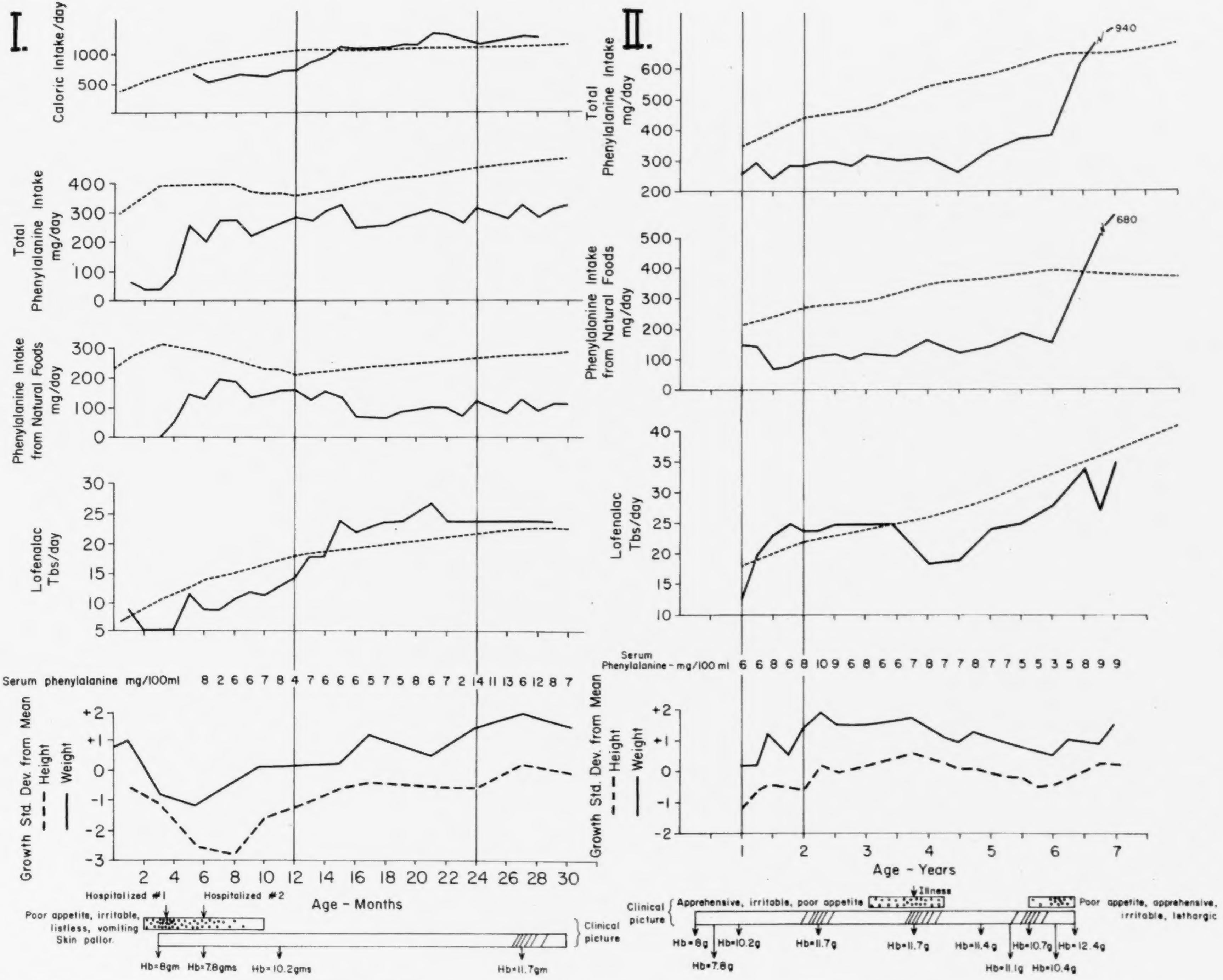
* Amount which must be supplied from natural foods.


I.
Caloric Intake/day
1000
500
Total Phenylalanine Intake mg/day
400
300
200
100
0
Phenylalanine Intake from Natural Foods mg/day
300
200
100
0
Lofenalac Tbs/day
30
25
20
15
10
5
Serum phenylalanine mg/100ml 8 2 6 6 7 8 4 7 6 6 6 5 7 5 8 6 7 2 14 11 13 6 12 8 7
Growth Std. Dev. from Mean
--- Height
— Weight
+2
+1
0
-1
-2
-3
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Age - Months
Hospitalized #1
Hospitalized #2
Poor appetite, irritable, listless, vomiting Skin pallor.
Clinical picture
Hb=8gm
Hb=7.8gms
Hb=10.2gms
Hb=11.7gm
II.
Total Phenylalanine Intake mg/day
600
500
400
300
200
940
Phenylalanine Intake from Natural Foods mg/day
500
400
300
200
100
0
680
Lofenalac Tbs/day
40
35
30
25
20
15
10
Serum Phenylalanine - mg/100 ml 6 6 8 6 8 10 9 6 8 6 6 7 8 7 7 8 7 7 5 5 3 5 8 9 9
Growth Std. Dev. from Mean
--- Height
— Weight
+2
+1
0
-1
-2
1 2 3 4 5 6 7
Age - Years
Illness
Clinical picture
Apprehensive, irritable, poor appetite
Poor appetite, apprehensive, irritable, lethargic
Hb=8g
Hb=7.8g
Hb=10.2g
Hb=11.7g
Hb=11.7g
Hb=11.4g
Hb=11.1g
Hb=10.7g
Hb=10.4g
Hb=12.4g

Examination of similar data on seven children for periods of three to seven and one-half years showed that growth lags were associated both with inadequate intakes of phenylalanine when compared to the requirement for age and total protein in the form of Lofenalac. Most treatment regimens, including our own, have stressed the importance of lowering serum phenylalanine values by reduction of phenylalanine content of the diet. It was apparent from the data that serum phenylalanine levels could also be lowered by raising Lofenalac intake. Many of the growth deficits were associated with deficient intake of Lofenalac rather than of phenylalanine.

Following evaluation and interpretation of the data we established a treatment regimen based on meeting recommended protein allowances as well as phenylalanine requirements. Our guide lines are shown in Tables 1-3. This has permitted marked liberalization of the dietary treatment of phenylketonuric children and has been used during the past two years to treat five new patients. Serum phenylalanine levels have been in the range between 5 and 12 mg%. One of the first patients treated under the liberalized dietary program showed us another important aspect of the relation between Lofenalac and phenylalanine. Our dietary recommendations had always been in terms of total amount of phenylalanine in the diet plus a recommended amount of Lofenalac. Lofenalac contains a small but significant amount of phenylalanine. The protein requirement and thus the amount of Lofenalac needed rises as the child grows. A formula prescribed for age two-three months is inadequate at four to five months of age. In this child, Lofenalac was not increased between three and five months of age; phenylalanine intake had been relatively constant; serum phenylalanine levels increased. By six months of age height began to lag. Following this observation the mother was instructed to increase the amount of Lofenalac formula, but no change was made in the total phenylalanine prescription. As a consequence the amount of supplemental phenylalanine decreased. Finally the supplementary phenylalanine was increased to balance Lofenalac in the diet.

This new concept permits the addition of more phenylalanine in the form of natural foods, greater variety in foods and allows for flexibility in choice of food. During initiation of treatment, phenylalanine is not completely withdrawn from the diet as previously. A minimum amount of 250 mg phenylalanine from natural foods, usually milk, is added to the Lofenalac formula from the beginning of treatment, so the child is never subjected to phenylalanine deficiency. Dietary recommendations are made separately in terms of amount of phenylalanine to be supplied from natural sources and amount of Lofenalac. Increases can then be made separately in Lofenalac intake or natural foods without the inadvertent decrease of phenylalanine from natural sources or of Lofenalac, a decrease which might be made to keep a total phenylalanine intake constant.

Once phenylalanine intake from natural sources and Lofenalac intake have been balanced properly for a given child, it is rarely necessary to reduce natural food sources to maintain blood phenylalanine levels in the control range of 5 to 12 mg%. Regular increases in Lofenalac intake are essential, however, to ensure proper utilization of all essential amino acids, including phenylalanine. In older children, phenylalanine intakes well above the minimum requirement can often be tolerated without marked increases in blood phenylalanine levels, providing essential amino acids furnished by Lofenalac are sufficient to balance the phenylalanine from natural sources. If Lofenalac intake falls below the recommended level, growth rate slows and utilization of natural food phenylalanine is reduced.

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Paul Zee, M.D., Ph.D.[*]

THE ROLE OF UNDERNUTRITION IN MENTAL RETARDATION[**, ***]

Many factors can interfere with optimal mental functioning. They include: (1) environmental factors such as poverty and education, (2) psycho-social experiences in the past (Freud), (3) genetic heritage, (4) anatomical abnormalities and (5) biochemical (nutritional) anomalies.

Nutrition is only one factor, but an important one, in that it can become the weakest link in the chain of events that lead to impaired functioning and development of the central nervous system.

There are no precise experiments that demonstrate in humans that a definite and direct relationship exists between undernutrition and retarded mental development. As planned malnutrition in children is unethical, one studies existing situations. However, it is virtually impossible to completely separate malnutrition ***per se*** as a cause of poor intellectual development from other factors such as poverty, high incidence of infection and parasitic diseases, adverse family conditions or lack of a stimulating environment.

The information that has been obtained, supported by data from animal experiments, strongly indicates, however, that in early life undernutrition interferes, and often irreversibly, with normal mental development.

Two kinds of experimental information have been obtained: (1) those relating undernutrition to physical effects (decrease in brain weight, decrease in number of cells, changes in chemical composition), and (2) those relating undernutrition to certain behavioral effects. It is usually implied that the physical defects will result in defective mental functioning.

Effect of Undernutrition on Growth and Development

Almost classic are the experiments of Winick (1968) in this respect. He measured the growth of cells in newborn rats in relation to nutrition. Because diploid cells have a constant DNA content in each animal species, he used the total amount of DNA in an organ as a measure of its number of cells. As a measure of cell size, he used the ratio of organ weight, or protein, to the DNA.

With these parameters, Winick recognized three periods of growth in rat pups. From 0–20 days all organs grew by cell division alone. From 21-42 days the lung and brain had stopped growing by cell division but grew by cell enlargement. From 64-86 days all organs grew by cell enlargement. He observed that interference with cell division cannot be reversed after the period of "growth by cell division." Thus, young rats starved until weaning will continue to be small. However, if they are starved for the first nine days of life the decrease in cell number can be reversed by abundant feeding from Day 10 to weaning.

In a subsequent investigation, Winick (1969) measured the DNA content in a large number of brains of infants and fetuses that had died of various causes. The DNA content (number of cells) in the brain increased rapidly, and linearly, up until five months after birth. About the fifth month of life DNA increase stopped, most likely because cell division stopped. Winick speculated that the human brain may also be more susceptible to the influence of malnutrition during the period of cell division.

It has also been shown in rats that restriction of the maternal diet during gestation results in offspring whose brain contains a permanently reduced number of cells. Subsequent starvation of these deficient pups after birth can reduce the number of brain cells to 40% of the expected number.

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[***] Presented at Nutrition Workshop, Child Development Center, June, 1969

Winick showed that the DNA content from brains of children with severe malnutrition was considerably lower than those of normal children of similar age. Three children had approximately 40% of the expected DNA content in their brain. This phenomenon is reminiscent of the doubly deprived rat pups who suffered undernutrition "in utero" as well as after birth.

In a recent study, Winick showed that during the first six months of life a reduced head circumference in malnourished children accurately reflects a reduced number of cells present in their brains.

Myelination occurs largely in the first three weeks of life in newborn rats. Malnutrition during this critical period decreases the myelination process as measured by the amount of cholesterol, sulfatides or other brain lipids that are deposited. Nutritional rehabilitation did not restore these deficits.

Other effects that have been measured in undernourished animals are delayed cell migration to the hippocampus, degeneration of neurones and glia and transient decreases in catecholamines.

Effect of Undernutrition on Behavior

A. Animals

Animal studies indicate that undernutrition in early life causes functional changes. The evidence, however, becomes circumstantial when applied to the learning capabilities of children.

Barnes found pigs and rats that had been undernourished early in life to be very excitable and emotional when subjected to a stressful situation. Their exploratory tendencies were less and they had an exaggerated drive to search for food. The male animals showed larger differences in behavior from controls than the females.

Experiments with pigs starved before weaning until Kwashiorkor-like symptoms appeared showed that they learn a conditioned response as well as controls. However, extinguishing this response with a painful shock was much more rapidly accomplished by the controls. Investigators who have fed protein-deficient diets for short periods of time after weaning have not been able to demonstrate any significant effect on learning behavior following rehabilitation. A depressed learning behavior has been claimed for second generation rats continuously fed a moderately low protein diet.

Dogs, undernourished early in life, will also show brain changes as well as marked behavioral abnormalities.

B. Children

Apathy, irritability, and lack of interest in exploring the environment are prominent clinical features of the malnourished child. As the nutritional condition improves, these signs characteristically disappear.

Kugelman ***et al.*** provided good nutrition to 100 mentally normal children between two and nine years of age in 1944. Fifty were malnourished and 50 were well-nourished, and matched by age and I.Q. After varying periods, Kuhlman-Binet and Stanford-Binet tests showed the I.Q. of the malnourished children rising an average of 18 points and that of the well-nourished showing no significant change. The implication is that because of dietary deficiencies the malnourished children had not reached their full potential and that the correction of deficiencies could be accomplished with good nutrition.

Cravioto in Mexico found that a group of malnourished children had a lower performance in all fields of behavior (adaptive, motor, language and social personality) when compared with standard children similar in age and ethnic background. The children who suffered from malnutrition in the youngest age group did less catching up than those who experienced undernutrition at an older age. When Cravioto used height as a measure of exposure to undernutrition, he found that taller children had greater intersensory integrative skills than small children.

Stoch and Smythe followed two groups of children of the same race and socio-economic environment in South Africa. One group was grossly undernourished at the beginning of the study and the other group appeared well-nourished. The authors found marked differences in the physical and mental development between the two groups. Notably, the head circumference was significantly smaller in the children undernourished at the onset.

Monckeberg (1) followed 14 children who had been hospitalized for severe malnutrition in early infancy. Three to seven years later these children looked clinically normal and no biochemical abnormalities were found. The only anthropometric measurement that was different from their peers in the same geographical and socio-economic area was the head circumference. However, intelligence testing showed the disastrous effects of their early deprivation. The average I.Q. was 62; the highest score was 76. In the Gessel test all but one scored below normal.

Drawing upon material from the Collaborative Study on the Etiology of Cerebral Palsy, Mental Retardation and Other Neurological Disorders, offspring identified as having cerebral palsy or mental retardation seemed to provide evidence that obstetrical history has only a minor effect on intelligence performance while racial-socio-cultural factors are associated with major deviations (2). Undoubtedly, undernutrition is a part of such racial-socio-cultural factors.

Summary

Undernutrition is an important cause of brain damage and abnormal behavior in animals. In children a strong association exists between malnutrition in early life and poor intellectual development. A causal relationship has not been proven.

The effects of undernutrition during fetal life and shortly after birth may be permanent.

A thousand dollars spent on prenatal care and food may prevent the loss of a million dollars used on behavioral and mental problems!

Most pertinent literature is repeatedly quoted in the following reviews. For historic interest, a 1931 editorial is included.

Winick, M.: Malnutrition and brain development. J. Pediat. 74: 667, 1969
Eichenwald, H. and P. C. Fry: Nutrition and learning. Science 162:644, 1969
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Dixie Crase, Ph.D.*

BACKGROUND OF DEVELOPMENTAL MILESTONES IN FEEDING**

The concept of development, fundamentally a biological term, involves the matter of growth, the matter of maturation and the issue of learning (See Addenda 1). We usually think of growth in terms of quantitative changes, actually an increase or change in size or structure of the organism. I will try to relate each of these broad principles of development to feeding and just give you a quick example. An example here would be the eruption of teeth, in particular the molars, being necessary for the child to adequately masticate his food.

The second part of development being the part of maturation is where we begin to talk about qualitative changes as opposed to quantitative changes. You may not be any taller or weigh any more or have changed obviously, but it is an internal kind of change. In fact, it is very often described as an unfolding from within. We usually suggest that it is due primarily to innate or inborn factors. So we suggest that you can't do very much about it. The maturational sequence further describes maturation, and some of these descriptive words may be a bit controversial, suggesting that the maturational sequence is rather fixed, a pretty definite order of development. It is rather inevitable, it is going to come eventually, it is irreversible--now this is debatable--irreversible suggesting that is genetically determined. When we say malnutrition is universal in nature, it suggests that it appears within all races; and, almost regardless of the environment, maturation will occur. Of course, this is not true of learning; it's not true of growth.

Learning, of course, is a matter of change of performance due to practice, and this is where most of you are going to really spend your time in helping children in difficult areas to change their performance. The second category is the matter of characteristics of development being expressed as principles of development. These are going to be very obvious kinds of things, the fact that development is similar for all, the ***order*** of development will vary little from one child to another. Now the thing that varies greatly is the rate of development. Development will proceed at different rates. In certain ways the child will not grow all at the same time; various parts and systems grow at various rates and at different times. When the young child is learning to talk he may not learn to walk, he may not say a new word for several weeks or several months. We are certainly aware that growth will show characteristic spurts or peaks, slowing down for periods of time, and I think a perfect example of this is the drop in appetite that is expected toward the end of the first year or beginning of the second year and continuing through the pre-school years for many children. Development proceeds from the simple to the complex. I think you can see how we could look at any aspect of development. We could look at language development. The child speaks words before he speaks phrases before he speaks sentences. In food it is very obvious that the source of nourishment moves from simplicity to complexity.

The fourth principle of development is proceeding from the general to the specific. In learning to pick up the food he makes broad, general movements toward an object before he can manipulate the thumb and the finger to pick up a small piece of food or whatever.

Development proceeds by stages. Again we might discuss any aspect of development, but we're focusing on feeding. Each stage has characteristic traits, and development is continuous with one stage influencing the next. This is where you begin to get cumulative effects of development, and this is why the early experiences are so terribly important because they build on and form the foundation from which other development proceeds. There are, of course, many unresolved issues in the study of development, and I think this is partly what makes it so exciting to talk about young children's development, particularly when they are having difficulty and require special assistance. We don't have all the answers. I will simply mention three issues. The first one is probably the oldest debate or the oldest issue, this is the matter of the relative importance of hereditary factors versus the environment. Hopefully, we're getting away from the old debate of trying to decide which is more important; but are trying to determine how they work together. Some animal research suggests that genetically based characteristics can be modified by early experiences, which is kind of exciting. The second issue is the relative importance of early developmental experiences. You recognize how important these are, you know that some people will take it further than other people. Freud will say that the specific timing of weaning, the specific techniques used in weaning a child, will produce long-range results, adult characteristics. Other people will modify Freud's position and say it's not the specific technique or the specific timing as much as it is the whole relationship of the parent to the child and the timing and technique of weaning are simply a reflection of that total relationship. The irreversibility of development--I think you would not be here if you didn't think that people can learn and modify their behavior, but we don't know what the child might have been had he not had a particular handicap or a particular experience. So, is development irreversible? I hope you are optimistic and not fatalistic or pessimistic on that particular issue. The final suggestion is again very broad, just a suggestion, that many factors influence children's development. When you say the child's world is going to influence him, the thing, of course, that pops to our minds is that two-thirds of the world's pre-school children are suffering from malnutrition to the extent that it retards their growth and permanently damages their health. This kind of world-wide scope is, of course, very familiar to you; and yet, I think it reminds you of the significance of that factor. The child's family and the family relationships are highly significant in many areas. We know that children brought up in an authoritarian home tend to be more nervous and sickly than children brought up in a democratic home. I'm not sure what that tells you about feeding or nutrition or growth and development, but it is an interesting fact. Certainly the socio-economic level is influential. When race of the family is considered, some believe that differences between races are actually socio-economic differences being reflected. Just recently, "Sports Illustrated" had an article about racial differences, helping one particular race to aspire and achieve in certain tasks, as opposed to another race. In other words, the whole concept of race is contradictory today. The size of the family, spacing of children, and prenatal conditions all are influencing factors in development.

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The birth order is important as an influential factor particularly when you keep in mind that 36 per cent of first-born children are born to teenage mothers, and teenage mothers are notoriously poorly nourished. What does this suggest happens to first-born children? Is a single or a multiple birth an important factor? If you take identical twins, would you guess that the twin of lighter birth weight would necessarily have the smaller intelligence? Would you guess this would pretty often be the case? It is. I was surprised. At least from the rather small sample used they did find that this was the case and their reasoning is that perhaps, (remember identical twins are sharing the same placenta--the same source of nourishment) that the lighter twin is at a disadvantage physically and perhaps is also at a disadvantage mentally.

The emotional status of the child is another factor. The placid child will tend to grow faster than the emotionally tense child. Again, I think, all these things remind you of the inter-relationship of food with other aspects of children's development. And, of course, intelligence is a very important factor. We do find that children with high intelligence, in general, are taller and heavier than children with low intelligence. So, again, the inter-relationship is particularly interesting.

When you look at the developmental milestones in feeding during fetal life it is very hard to set a specific chronological number of months that one child is going to remain in the same stage (Addenda II). The next part of the chart (Addenda II) describes the oral activities that are related to ingestion of food, the neuromuscular development that you are likely to see accompanying the child at this point, and then the issues and some of the concerns at each of the stages, will again be just briefly mentioned. Of course, beginning with stage one, during fetal life the food supply must be in a form which can be transferred from the mother's blood stream to that of the fetus through the placenta. At this time the prenatal and/or pre-conception diet become of the utmost importance. A woman takes with her into pregnancy her whole nutritional past. In fact, it is being suggested that the lifetime dietary history of the woman is equally important as her diet in the nine months of pregnancy, if not more so. A woman who begins pregnancy with a healthy body is much more likely to keep up an adequate supply of calcium, both for her own and her child's needs, to have good retention of nitrogen, etc. The individual who waits until she is pregnant to practice satisfactory food habits may be too late since most women are not immediately aware that they have become pregnant and this is the very time that the major organs and systems of the fetus are being formed. A recent report of the Food and Nutrition Board of the National Research

Council challenges the wisdom of certain widely used dietary prescriptions in prenatal care in the United States and Canada. For example, the Council suggests that the weight gain in pregnancy should be closely monitored with the objective of achieving an average gain of 24 pounds; it seems to me we've been saying 20 pounds for a long time, and we've been saying that women who are obese should lose weight during pregnancy. The Council is saying, "Not so." The routine limitation of weight gain is certainly being questioned. They are also questioning the routine augmentation of diet with vitamin and mineral preparations except for iron and folic acid in some cases. So the prenatal diet is still of great concern.

At birth, of course, the way in which the infant obtains food suddenly becomes different. The mouth becomes the portal of entry for nourishment. The sucking reflexes which are present at birth are the infant's mechanism for finding and taking foods into the mouth. The immaturity of the mouth and other parts of the digestive tract at birth necessitate a highly simplified food, namely breast milk. When this is not available, nourishment is provided through a satisfactory substitute. During the first few days of transition from fetal existence to that of an independent organism, the newborn receives colostrum, the first secretion of the mammary gland and a highly specialized product adapted to his needs. The matter at issue here is that there seems to be wide agreement by most authorities that breast feeding is preferable to bottle feeding; and yet, what percentage of mothers choose to breast feed? About one out of five. Any slight revival of interest that you see seems to be occurring among women of the middle and upper social classes where education is apparently the influencing factor. Although progress in weight is not the only criterion that is used in evaluating the feeding program of an infant, bottle-fed infants' gains exceed those of the breast-fed baby, so he seems to have that advantage. On the other hand, bottle fed babies have their peak number of infections earlier when they are more immature and less well equipped to cope with infections. Undoubtedly, the value of breast feeding is greater in less well-developed countries and in less-favored economic classes. We've looked at this issue from the child's point of view, but you can reverse it and look at it from the mother's point of view and talk about her attitudes toward breast feeding and that of convenience, whether it is an economical issue of time or energy, the husband's attitude, etc. We do not find any long-term consistent effects upon later behavior that can be directly traced back to whether the newborn was breast or bottle fed. In other words we can't look around the room and say, "Aha, he or she was breast fed or bottle fed." So it kind of leaves you with not knowing whether it's that important, although most authorities suggest that at least for the first two weeks they would prefer breast feeding.

The second stage of development is infant stage one. As the child begins to grow he needs essential substances added. The first additions include vitamin C and vitamin D. The infant generally thrives on milk supplemented with vitamin C and D until he is about three months of age. The newborn and the young infant require immediate gratification of this need for food. This immediacy is an expression of their lack of development of the inhibitory functions of the cerebral cortex and a relatively ineffective physiological homeostatic functioning. When this prompt gratification of the infant's need for food is provided by feeding him according to his physiological rhythm, we call this self-regulation or self-demand feeding. From birth to the first few weeks or months this physiological rhythm will be irregular, but later it will usually become regular. Of course, this brings up the issue of establishing a feeding schedule very early. If you looked at articles in 1920, 100 per cent of the articles were saying feed the baby according to the clock--on a very tight feeding schedule. In 1948, 100 per cent of the articles were saying feed him on a self-demand schedule. Today, we are taking a middle-of-the-road position, believing that the baby is not put on a rigid schedule, but he is guided into a reasonable feeding habit. Feeding the infant in the early months by satisfying his food needs as well as his wants and security prepares him for the time when eating becomes a more complex, voluntary act, under conscious control.

The third stage of infancy involves the introduction of semi-solid foods, such as cereals, vegetables, etc. These supply the increasingly complex food elements the body can use. By three months or so additional iron, thiamine, calories, etc., seem to be needed. The time of introduction of solid or semi-solid foods is best determined according to the child's developmental status, which means that you can't go on age alone. Weight may be a better clue than chronological age. Readiness for more complex foods is indicated by the fact that the three-to-four-month-old infant can transfer food voluntarily from the front to the back of his mouth.

Physiological readiness for complex foods demands much mouthing activity. In other words, he has a biting reflex, salivation appears, he bites and begins drooling. This seems to be taken as an indication for introducing the pureed food. When foods other than milk begin to be introduced, a new element enters the feeding picture--choosing not only the amount of food to be taken, but also the kind of food. At this time, of course, adults play a tremendous role in determining what kinds of foods will be made available to their children. These additional foods not only supply the needed food elements, but they also help to accustom the infant to variety in flavor and texture of foods. The use of each new eating utensil is a learning experience; and, if you ignore this fact, then the infant's refusal of the utensil with which the food is offered may sometimes be taken for food refusal. For example, before semi-solid foods are offered to the baby he can become accustomed to the spoon if it is used several times to give him his orange juice. In this way when he is given a new food, he has only one thing to learn.

The issue at this stage is the wider acceptance, or improvement in food acceptance. Some suggest that if you introduce these foods earlier than three months, there might be an improvement in food acceptance; yet, there does not seem to be a conclusive agreement on that side. The premature stage is when the child is able to tolerate well-chopped foods, and his oral activity increases so that destructive biting and the ability to swallow small lumps can be accomplished. This stage, of course, coincides with the eruption of teeth. This slight simplification of the food is necessary because the child has not learned to chew and has an inadequate number of teeth to masticate his food satisfactorily. The infant's teeth will usually begin to erupt sometime between five and eight months of age. This is the period when he puts everything into his mouth. Now he is ready to learn to chew. It is important that he be given this opportunity because young children who have only liquid and pureed foods throughout the first year will frequently refuse coarser foods when they are offered at a later time. This corresponds with the idea of there being critical or sensitive periods in development intimately related to maturation, at which time a specific stimulus will lead to a characteristic behavior. If children are not given solid food to chew when they are able to, then troublesome feeding problems may occur later. By the age of nine months many children will be taking their food in three meals a day with between-meal snacks of fruit juice or milk. Some children are ready for this routine at an earlier age; in others, it is delayed until later.

When the child is one year of age, he should have become acquainted with and learned to eat almost all the foods that will form the basis of an adequate diet throughout his lifetime. This may seem early, but I must remind you that the time to pay attention to food habits is while they are being formed--during the first year. Of course, an issue involved at this stage is the matter of weaning. This is a gradual process if you interpret weaning correctly, because it actually extends back into the earlier life of the infant with the first addition of vitamins and proceeds through the various stages with the addition of new foods of different tastes and textures and smells; the mouthing of foods; and finally, the dropping out of sucking and the acquisition of skills of drinking from a cup and the management of whole foods. The timing of weaning from the breast or bottle to cup will vary according to the rate of development of the child and the setting in which he lives. For most children some time during the last quarter of the first year is a time when other means of eating are greatly increased. This seems to be an appropriate time from many pediatricians' points of view. Others will suggest that it appears wise to either begin the last stages of weaning before the end of the first year or wait till the end of the second year. It is always interesting to have people say, "Why?" Why are you going to wait this whole year before you try it again, if you are not successful at the end of the first year? Perhaps it is because so much development is going on in so many other directions during the beginning of the second year of life. Of course, the lasting effects of weaning on personality development seem not to be attributable to the manner and the technique and the timing so much as they reflect the characteristic relationship of the parent and child from the very beginning.

The mature stage is, of course, the final stage when the child can eat solid foods which are prepared for digestion and reduced to a simple form entirely within his body. He is nutritively mature and physiologically capable of utilizing the food served to the family. Of course, the final oral indication is chewing, by which the infant is able to reduce food to a consistency that can be swallowed. This requires at least the first molars. Children will vary widely in the time required to learn to eat whole foods. Usually by the time the child has twelve to sixteen teeth he begins to masticate his food satisfactorily and can feed himself. At this stage he may have some meals with the family and share the family diet. This is in a certain sense a transition period from feeding himself part of his meal and being fed the rest by his mother to participation in the group and becoming independent by self-feeding. Many children will have reached this stage of maturity by their second birthday, although there is again no chronological level that is to be fixed for every individual child. The main issue at this time is that towards the end of the first year, the infant's appetite begins to slacken. He is now growing more slowly, he actually needs less food for growth and at the same time his motor and social development is less accelerating. He becomes preoccupied with the world around him. He shows a strong desire for independence in his activities, including feeding. This is a period of growing independence in self-feeding and expression of choice of food. And if you have heard Ginot speak, he makes a very important issue of choices. Erickson says the same thing: The child simply has to make many decisions in order to establish a sense of autonomy. In the areas of food this is true as well. Ginot suggests you ask your child if he wants a half glass of milk or a whole glass of milk. If he says he wants a half glass of milk, then you put it in a very large glass. When giving him a choice, it should be a choice within limits. You don't say, "What do you want for breakfast?", but you say, "You might have Raisin Bran or Rice Krispies." This period of change in appetite and food acceptance is very often continued into the pre-school years. For some children it will last only a few months, but for others it will continue for five or six years. If you look at the Denver study, and I think these were upper middle class children so maybe this limits the implications of this study, but in any case, when they asked mothers of six months old children how many of their children have a good or an excellent appetite 85 per cent of six months old children had good appetites. But when they asked mothers of three and four year olds, the percentage dropped way down until actually about 20 per cent of these children were reported to have good or excellent appetites. If a generalization may be made from the Denver study, most children will not suffer nutritionally from this drop in appetite. Another study from the Child Research Council reports that, except for brief periods of weight loss, there seemed to be little clinical evidence that the lower intake of some nutrients were harmful at this age. In other words, if you have a healthy child who is not subject to an excessive number of illnesses and does not have an extensive weight loss, his indifferent appetite for food during this period is not to be a matter of special concern. However, the types of food which are offered should be of high nutritional value when his appetite is limited. Many of the studies will remind us of the importance of offering children a choice among suitable foods and making sure there is no undue pressure to eat. Parents who are unaware of this may coax the child to eat and in so doing they may actually create an appetite problem or, on the other hand, the habit of overeating. If there is enough pressure early enough this can happen.

I think it seems obvious from this very brief discussion that we don't have final answers concerning children's development in feeding or many other areas. In fact, a review of the representative literature on feeding practices shows that the actual evidence for what is "good" and what is "bad" is neither consistent nor conclusive. In fact, some are inclined to shrug their shoulders about recommendations for child-rearing practices in the feeding area. The best conclusion about the specifics of feeding seem to be that mothers who are well-meaning and who try relaxedly to do what they sincerely believe is best for their children, particularly when this is in harmony with the cultural ways of the community with which they are most closely associated, obtain the best results with their children.

I don't know where that leaves us! Is it just a matter of a mother doing what she thinks is best? Such evidence as we have indicates that feeding disturbances are deviations from normalcy in development, though they are much less related to specific methods of feeding the baby and are very much tied in with many aspects of the parents' adjustment, their personalities, their attitudes, the tension or relaxation they have with their children. This gets you into the whole topic of child and family development, which is, of course, of great interest for me. Other people, other authorities, will agree that the specific relationship between infant feeding practices and personality during childhood simply cannot be fully described at this time. Someone has said it is an interesting time to be alive because there are so many good fights going on and I think there are many unresolved issues in this area as well as others. I know that you are primarily concerned with the nutritional aspect of children's development, but I know that you are interested in children's development in general. Let me conclude by giving you an excerpt from an article that was entitled "What Price Virtue."

It seems to say something to me and I hope it will to you. In conclusion we might say that we all want good children. The problem arises when we try to make more specific what we mean by "good."

> "Is a good child a popular child? A need to be popular may involve giving up one's own taste and judgment for the wishes of the group. Is a good child an average child? The men who developed immunization against smallpox and polio, who developed TV and wrote symphonies and ***The Grapes of Wrath*** were not average children. A good child is clean, neat, and orderly. The Nazis had a great love for order; of course, no one had much freedom. A good child is happy and well adjusted. Should a child be well adjusted to poverty, to prejudice, to ignorance, to starvation? We are in the business of making children how we want them, but it too often appears we do not know how we want them."

Robert M. Hutchins, former president of the University of Chicago, suggests that we face two urgent problems. The first is survival, for which we need draw no pictures, and the second question, if we should survive, what should we do with our lives; and even more importantly, what should we do with our children's lives?

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Addenda 1

THE CONCEPT OF DEVELOPMENT

A. Development comes from growth, maturation, and learning
   1. Growth - Quantitative changes, increase in size or structure
   2. Maturation - Qualitative changes; due primarily to innate factors
   3. Maturational Sequence - Fixed, inevitable, irreversible, universal
   4. Learning - Change in performance due to practice

B. Characteristics of development maybe expressed as ***principles of development:***
   1. Development is similar for all. The order of development varies little from one child to another.
   2. Development proceeds at different rates. The organism does not grow uniformly or all at the same time. Various parts and systems grow at various rates and at different times. Growth shows characteristic spurts or peaks and then slows down for a period of time.
   3. Development proceeds from the simple to the complex.
   4. Development proceeds from the general to the specific.
   5. Development proceeds by stages. Each stage has characteristic traits.
   6. Development is continuous. One stage influences following stages.

C. There are certain unresolved ***issues in the study of development:***
   1. The relative importance of hereditary factors and the environment
   2. The relative importance of early developmental experiences
   3. The irreversibility of development

D. Many ***factors influence children's development:***

   1. The Child's World -
   2. The Child's Family -
      Family Relationships
      Socioeconomic Level of Family
      Race of Family
      Size of Family and Spacing of Children
   3. The Child -
      Prenatal Conditions
      Birth Order
      Singleton or Multiple Birth
      Sex
      Physical Health
      Emotional Status
      Intelligence
      Early Experiences

Addenda II

DEVELOPMENTAL MILESTONES IN FEEDING

[*]STAGE	APPROXIMATE AGE	SOURCE OF NOURISHMENT	ORAL ACTIVITIES RELATED TO INGESTION OF FOOD	NEUROMUSCULAR DEVELOPMENT	ISSUES
Fetal	Conception to Birth	Maternal Blood Stream	———	———	Preconception and/or Prenatal Diet
Newborn	Birth to 10 Days or 2 Weeks	Colostrum or Substitute	Rooting and Sucking Reflexes	Putting hand or thumb in mouth	Breast versus Bottle Feeding
Infant Stage I	2 Weeks to 3 Months	Milk plus Vitamins C and D	Rooting and Sucking Reflexes	Putting hand or thumb in mouth	Establishing Feeding Schedule
Infant Stage II	3 Months to 5-8 Months	Semisolid and Pureed Foods	Transfers Food Voluntarily from Front to Back of Mouth Biting Reflex and Drooling	Helping to hold the bottle	Improvement in Food Acceptance
Pre-Mature	5-8 Months (teething) to 2 years	Well-Chopped Foods	Destructive Biting and Ability to Swallow Small Lumps	Ability in a sitting position to reach for and convey object to mouth Ability to drink from a cup Mastery of use of a spoon	Weaning from Breast or Bottle to Cup
Mature	2 years (12-16 teeth) through preschool	Solid, non-simplified foods	Chewing which requires at least the molars	Mastery of use of other utensils	Appetite Begins to Slacken

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[*] **Breckenridge, Marian E. and Margaret Nesbitt Murphy. Growth and Development of the Young Child. Philadelphia, W. B. Saunders Company, 1969, p. 160**

Robert Christopher, M.D.[*]

EVALUATION OF DEVIATIONS IN FEEDING ABILITIES[**]

To evaluate a child with feeding disabilities, one needs to know what is required for a child to be able to feed himself. There is more to it than meets the eye.

First, feeding can be divided into two parts, ***passive*** and ***active.*** Passive feeding is where someone else is feeding the child whereas active feeding is where the child feeds himself. Passive feeding, which occurs from birth to eight months, usually, is the earliest type of feeding and can be divided into two stages. The diet during this time is usually liquid.

What does the child need to be able to do in order to eat during the early stage of passive feeding? Well, first of course, he needs to be able to suck. It is very interesting that nature and the Good Lord endowed newborn children with a very special mechanism of which people may not be aware. In normal babies there are special fat pads located in both cheeks just lateral to the mouth. These fat pads serve to form the lips into a pucker, the sucking position. All infants have a kind of rosebud-shaped mouth. As they get older, their lips assume a more horizontal position like adults and the fat pads disappear. Yet, these fat pads have a definite function; if an infant does not have them, sucking problems arise.

There is another rather interesting situation with regard to the sensation and the nerve supply surrounding the mouths of infants. The nerves around the lips are extremely sensitive to touch and pressure. When one strokes the sides of an infant's lips, the infant immediately begins sucking. Or, when one places the nipple of a bottle on the cheek of a baby, the baby immediately begins to look for the nipple and a sucking response is initiated.

These are the two automatic built-in mechanisms that help a baby assume a normal sucking response. If a child has brain damage or some damage in his sensory system, these automatic responses may be absent. Some other means then may have to be used to stimulate a sucking response. The first requirement of feeding is ***the ability to suck.***

Secondly, the infant must be able to ***swallow.*** Swallowing can be separated into two major divisions (voluntary and involuntary) and into three phases. The first phase of swallowing is ***voluntary*** whereas the last two phases of swallowing are ***involuntary.*** During the ***voluntary*** division (phase one) food is propelled from the front of the mouth to the pharynx. The tongue and cheek muscles and the lips squeeze together and the tongue elevates pushing food to the back of the throat. When food gets back to the pharynx, the last two phases, the ***involuntary*** division, take over automatically. In other words, the infant must be able to get food to the back of his mouth. Once it is back there, an automatic mechanism begins to propel the fluid down. Then the remaining two-thirds of swallowing occurs as an automatic response through two of the cranial nerves. These nerves, cranial nerves IX and X, originate in the brain and enter the throat, innervating the esophagus and propelling the food in a rhythmic, peristaltic fashion all the way down into the stomach. Defects may occur in either the voluntary or involuntary divisions of swallowing. When such problems occur in the voluntary part, they can often be overcome by training and substitutive muscle movements. If deficiencies occur in the involuntary division, often surgery is the only beneficial treatment.

The second stage of passive feeding occurs from six to eight weeks until six to eight months. This period lasts from the time the child is introduced to blended foods until he begins self-feeding. The sucking and swallowing activities continue, but new activities are being developed. At this age the baby begins to

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adapt his mouth and swallowing mechanism to the function of taking in semi-solids. He must be able to ***open his mouth.*** The major muscles necessary for this function are the small strap muscles that form the floor of the mouth. When these muscles fail to function, the child cannot open his mouth and thus feeding difficulties arise.

This next function at this stage is the ability to ***close the mouth.*** Without this ability, foods fall from the mouth and drooling becomes quite a problem. Closing the mouth is primarily the function of two muscles, orbicularis oris and temporalis. The orbicularis oris is around the mouth, and temporalis is a big muscle along the temporal side of the head. The temporalis comes down into a tendon which hooks onto the mandible or lower jaw bone. Bite down hard and feel over the side of your skull to feel the temporalis contracting in front of your ear. It is a very strong muscle and one of the main muscles in chewing. The orbicularis oris is the more important when it comes to drooling. With special therapy, the muscle can be strengthened.

As with the early stage, in this stage of passive feeding the infant still must be able to propel food to the back of the throat. At this level of development, more strength is required for this activity because now strained foods as well as liquids are being propelled. More muscular function as well as a moderate amount of coordination is necessary. The infant must be able to coordiante the muscles that pull in the cheeks with the ones that close the lips with the ones that pull in the tongue. Complex, isn't it? If coordination defects occur, even though the child may have the strength, drooling may still occur. Again, there are techniques for overcoming this type of defect. In evaluating a child for feeding problems these different aspects of feeding are to be considered.

Swallowing, of course, is the same as described previously. Once the food is in the pharynx, swallowing becomes an automatic reaction.

Active feeding begins when a child starts feeding himself. Most children begin this activity as early as six to eight months; yet, the onset is variable and depends upon many factors, e.g. intelligence, coordination, etc. Even simple tasks like holding a cookie may not occur until very late or maybe never in the case of a severely or profoundly retarded child. Every child develops at his own rate. Depending upon his intelligence, coordination and environment, a child's developmental age may be higher or lower than his chronological age.

In the early stages of active feeding, problems may first become apparent. What does a child need to be able to do in order to feed himself? Obviously, in order to hold a cookie or a cracker, he must have good functioning finger and thumb flexor muscles. They must come together so that he can pinch the cookie. If these muscles are weak, spastic or incoordinated, physical or occupational therapy may be required. Obviously, if a child cannot hold a cookie, he cannot hold a spoon.

Once a child learns to hold a morsel of food, he must be able to lift it to his mouth. This process involves ability to place the hand in a position to pick up the food and then move the food up to and into the mouth. For this operation, reaching and fetching, proper functioning arm and hand muscles and eye-hand coordination are necessary. The wrist extensors enable the child to hold his wrist up and keep it in a stable position as he moves food to his mouth. Elbow flexion enables the child to raise his arm and bring his hand to his mouth. Supination, the ability to turn the arm over palm up, and pronation, the ability to turn arm over, palm down, are both operations necessary at this stage of self-feeding. When defects in either of these areas occur, it becomes impossible for a child to get food to his mouth. With special therapy some defects in these areas can be corrected.

For feeding, a child also requires proper functioning of the shoulder flexors and abductors. Again, these are needed to position the hand. The shoulder flexors are the muscles which bring the arm forward. The abductors bring the arm out to the side. If these muscles, the shoulder flexors and abductors, became paralyzed, the arm would hang at the side and self-feeding could not be mastered. Actually, when feeding oneself, one brings his arm out to the side slightly and flexes it at the shoulder to some degree. Then one can raise it to his mouth. This is all a part of placing the hand in a position where it can move from the plate or table to the mouth.

Again at this stage, closing the mouth is necessary. Now, however, biting and chewing are essential too. For biting and chewing, muscles like the temporalis and buccinator are needed as much as the teeth. The temporalis functions in biting while the buccinator, located inside the cheeks, serves to prevent food from dropping into the trough between teeth and cheek and to keep the food on the grinding surfaces of the teeth. When one chews, the food is kept on the grinding surface of the teeth by the tongue on one side and the buccinator on the other. When food is masticated, the tongue relaxes, the buccinator pushes the food to the middle of the tongue and the tongue pushes the food to the pharynx so that the involuntary stage of swallowing can take over. The buccinator, therefore, is a very important muscle because it keeps food positioned for both chewing and swallowing.

The later stage of active feeding begins as the child learns to use feeding utensils. Usually, children first master spoon-feeding, then progress to the fork and finally learn to cut with a knife. To grasp utensils the child usually begins with a "palmer grasp". Some children never progress beyond this stage. The next stage is the "three-jawed chuck grasp". In this stage the child grasps with three fingers---the thumb and two fingers. These fingers come together to pinch things, e.g. spoon, fork, pencil, etc. If a child is unable to progress to the pinch and cannot hold feeding utensils well enough to master the art of spoon feeding, modified feeding tools can be instituted.

After learning to hold the utensil, the child must be able to place the end of the utensil into his mouth. The end is specified because when one tries to feed himself with the side of a utensil, problems are encountered, e.g. food falls from the utensil, the utensil will not fit into the mouth, etc. The movement of the utensil to the mouth requires many of the same muscles and functions discussed previously, that is, wrist stabilization, supination, elbow flexion, etc. Also, radial deviation of the wrist is needed to bring the tip of the utensil to the mouth.

The teeth play an important role in eating and have two major functions. The incisors, which are the sharp teeth in the front, have as the function of biting off a morsel of food. The molars serve to grind the food into pieces small enough to swallow. Both functions must be performed for effective eating.

In summary, the presence or the absence of each of these functions must be evaluated to determine if feeding skills can be developed. The deficiencies must be determined before a training program for feeding can be devised. There are a few other non-muscular or non-physical requirements for feeding, which must be present in variable amounts. In the case of intelligence, the more there is the easier the training. This is not to say that one cannot teach the retarded child to feed himself. At any rate, intelligence is a very helpful factor in teaching a child to feed himself because, in the final analysis, all forms of physical and occupational therapy are learning experiences. If a child does not understand the goals of the training program, he is not going to understand why we are working and it all just becomes a game to him.

What, specifically, does he need the the function of intelligence for? Intelligence is needed for him to understand the directions. Both demonstration of physical exercises and verbal instructions are employed in teaching self-feeding. The second, possibly more important reason we need intelligence is for carryover. Carryover, is the ability to remember the technique that is taught one day until the next day. Often children will learn very well during the therapy session, but the next day when they come back, they can't remember anything learned the day before. This carryover, therefore, can be a very handicapping thing, if the child does not have it.

Suffice it to say that nearly all children can be taught to feed themselves, if they do not have physical handicaps. Feeding training may take a long time depending on the degree of their disability. The single factor that determines whether a child can learn to feed himself is not usually due to muscle weakness. Rather, it is usually due to the factor of intelligence. Bright children with rather severe degrees of weakness or spasticity can often overcome most of their handicaps. They can understand what you are trying to teach them. On the other hand, children with relatively mild degrees of weakness or spasticity who are profoundly retarded may never be able to overcome their physical handicap. In all types of physical rehabilitation programs for the handicapped, intelligence is probably the most important single factor in determining whether disabilities can be overcome.

Hearing, of course, is important. If the child is deaf, sign language or pictures must be used. Deafness is not an insurmountable problem. Teaching is easier when the child can hear. Of course, children need sight for demonstration. If you're teaching them how to feed themselves, they need to be able to watch you.

Sensation is something that is not so obvious. Everybody knows that we have a sense of touch, but most people fail to realize that it can be broken down into a number of different forms. We can feel deep pressure, light pressure, heat and cold. Each sensation is received through a different nerve ending and there are many thousands of these endings in the skin. These are all separate functions carrying impulses into separate parts of the spinal cord and separate areas of the brain. Any one of these sensations may be missing without the others, or they all may be absent. The sensations necessary for feeding-training are touch and pressure.

The second needed sensory modality which you may not find quite so obvious is proprioception. Proprioception refers to position sense. One knows where his extremities are located in space because one has this special sense called proprioception. The joints and the muscles have special nerve endings which go to a part of the brain that tells one where his extremities are at any given time. This is true not only for extremities; one can even tell whether his mouth is half opened or closed with his eyes closed. The sense of proprioception is present throughout the body. Often one does not realize he has such a sense until he loses it. Various diseases can cause the loss. Think what it would be like to try to walk not knowing where your feet are without actually bending over and looking at them. This would be a pretty labored way to walk. It is the same with feeding. If one did not know where his arm was or where his hand was without having to look at it, he would have a difficult time feeding himself. Position sense cannot be developed with exercises, but one may be taught to feed himself without it. It is important, however, for one to know whether it is present or absent. Therefore, position sense is evaluated in children with deficiencies in feeding skills.

Now to discuss some of the people who have a role in this teaching of feeding skills and something about their roles. Often the rehabilitation team is likened to a football team with the doctor being the quarterback. He calls the plays, but he does not tell everybody how to perform their particular function. He does not tell a tackle how to block or the end how to catch passes. He tells them what is going to be the best approach to accomplish the goals of the team and each person on the team has his own expertise. If the team is functioning properly, they should have the freedom to perform their functions the way they know best. Of course, the physician's function on the team is teaching feeding skills and other members of the team have both of the following functions: the evaluative function and the therapeutic function. Some of the people on the team may primarily evaluate where others may mainly treat the disabilities, but most of them really do both.

The physician's responsibility includes diagnosis of the disability. This is more than simply saying, "Well, this child has cerebral palsy." He must outline what particular deficiencies the child has and may need assistance from other members of the team in the evaluation. The physician must diagnose the disability as to the neurologic type, and he should make some reasonable prediction as to whether this child has rehabilitation potential. Obviously, there is no point in attempting to work with a child that is too severely handicapped, and the physician is often called upon to make such a decision. The decision to treat or not to treat is often difficult. Sometimes children are placed on a trial program for a month to six weeks and if they do not begin to show some response to the techniques, the program is discontinued. It is really very rare to find a child that is so severely handicapped that he can't improve to some degree.

This physician on the team may be a pediatrician, orthopedic surgeon, neurologist or he may be a specialist in physical medicine and rehabilitation. The children often are referred from private doctors and in that case the physician is usually a pediatrician or general practitioner. Regardless of the specialty, this physician must understand something about the problems of feeding skills training and should be able to provide the needed information. Such information may not come in the referral letter. A call to the physician may be needed to determine, "How well can he use his arms and legs?" Sometimes one may have to ask a physical or occupational therapist to evaluate a child to determine muscle and nerve function and ability. The physician, therefore, diagnoses the disability and determines whether there is any sensory or motor loss in the given case.

A physical therapist also has a role in evaluation. She evaluates specific muscle weakness and/or incoordination. Range of motion, the ability to move the arm through its normal range, is evaluated by this therapist.

The physical therapist provides a treatment function in getting patients ready to learn feeding skills. The occupational therapist then takes over, at which time the occupational and physical therapists' functions may overlap; that is, the occupational therapist may be working on feeding skills training at the same time the physical therapist is doing the exercises to try to build up the strength.

The occupational therapist plays an evaluative role in the determination of deficits in specific feeding skills. That is, she actually observes the child in various feeding situations to see how he functions. This gives a better idea of where to start the training program. The occupational therapist may provide adaptive devices if the feeding skill deficiencies cannot be overcome by teaching. For example, if a child can not pinch, he may need a specially designed spoon. The occupational therapist always tries to teach feeding with normal utensils first. If they cannot be used, the adaptive measures are introduced.

From the physician's standpoint, the nutritionist's major role is in designing a proper diet, not only one that is balanced, but one that will fit the particular deficiencies of the child. If a child is not able, for example, to take solid foods or foods that are hard to chew, then he must have something softer. The nutritionist or dietitian is an important member of the skills training team. When physical or occupational therapists are not available, the dietitian may often be called upon to consult with the ward nurse or the doctor's office nurse for assistance in teaching skills for feeding. It is important that dietitians and nutritionists become somewhat acquainted with the different techniques in feeding training. They may be the only team members available to assist the nursing and medical staff in overcoming these feeding problems.

The psychologist assesses the intellectual functioning of children and determines pertinent personality characteristics and potential for learning. Some children who are perfectly capable of learning to feed themselves may have a bad family situation and may be so nervous each time they come to therapy they can not keep their minds on what they are doing. This is frequently a problem in older children. We may need some projective testing from the psychologist to tell us if this child has a lot of background problems which are interfering with his learning. The psychologist may need to treat the particular problems through counseling with the child and with his parents. He, therefore, will play an important role.

The social worker evaluates the family situation regarding the ability of the family to assist the child in learning skills. In other words, the occupational therapist teaches these skills to the child in the clinic, then he goes home and the mother feeds him and does not give him a chance to feed himself. What has been accomplished? The social worker is the liaison. She talks with the family. Of course, other members of the team may talk with the family also, but the social worker especially is important. She can best make the family understand the importance of independent feeding for their child. The family will not always be able to feed the child; the child will become an adult. Reality must be faced. The social worker is the team member best equipped to help the family come to grips with the reality of their child's problem. By maintaining a liaison between clinic and home, the social worker can help in the carryover of skills training.

The public health nurse, especially in regard to out-patients, makes visits to the homes of these families and makes sure that the families are continuing with the feeding skills training. She must, therefore, be familiar with the techniques and must know what is going on with regard to training, if she is going to assure a good follow-up at home. The public health nurse comes in for team conferences so that she may understand why it is important that she make regular home visits, which are difficult for the rest of us to find time to do.

The child's teacher is important in making sure that there is a carryover of skills in school. A child with feeding difficulty may eat very slowly, and the other children in school may make fun of him. Often handicapped children won't eat at school at all. The teacher must give the child special attention so he will be encouraged to eat with other children and gain independence.

The parents and the siblings, of course, are important to assure the carryover of skills at home. Family cooperation for carryover should be coordinated with the social worker.

In summary, one can say that in evaluating deficiencies in feeding skills, one must take many factors into account. ***Physical Factors:*** The ability to hold a utensil, the ability to raise the utensil to the mouth and place the food in the mouth, ability to chew and ability to swallow. Although the ability to cut food was not discussed, it is a skill which comes later. If you can teach a child to feed himself, you can teach him to cut food. ***Psychological Factors:*** Intelligence and emotions. Many children may have intelligence to learn but have emotional problems which interfere. ***Social Factors:*** Carryover in the home and in the school. In establishing a feeding training program, first the physical disabilities, feeding deficiencies, potential for learning and social and emotional factors involved must be determined. Then the rehabilitation team, working together, can develop a program tailored to meet the needs of the child. Feeding training is not easy; yet, by breaking the feeding process down as has been discussed herein, successful programs can be devised and children can become independent in feeding.

Cathleen Zinkus, O.T.R. *

FEEDING SKILL TRAINING **

The normal baby is fed and taught to feed himself in the normal developmental sequence. The feeding problems of a handicapped child arise if he has difficulty sucking, swallowing, chewing, or difficulty with tongue control, lip pressure and later on, in sitting balance and in the upper extremity control necessary to feed himself. Although the first purpose of eating is biological, it is also a gateway to the world of feeling, speaking and many other learning experiences. The handicapped child may have had a difficult set of experiences. The child may have thrust the nipple from his mouth violently, not out of anger, but because of his spastic tongue. Enlarged holes in nipples may have allowed too much liquid to flow into the mouth too fast so that vigorous tongue and lip sucking movements were hindered and gagging and choking behavior resulted. The child may have been passive during hunger, not because of disinterest, but because of a physical inability to take what was offered. The child's knowledge may have been based on a series of bizarre experiences in which his head was forcibly held so that the food might be poured down his throat. He may have been denied the calm experiences of sucking, using his lips and mouth, and later on his jaws and teeth in order to both satisfy himself and to learn. Many a parent or aide has unwittingly permitted a standstill in the development of sucking, swallowing or chewing reflexes through continuing to feed the child only soft foods and liquids and placing them in the mouth in such a way that a minimum of mastication was necessary.

At a time when the normal child was learning to feed himself, the handicapped child may have been helped excessively. When the normal child is participating easily at the table with others, the handicapped child may be very dependent on others. He may be experiencing his first feelings of defeat, and with defeat the child may come to feel that he must remain helpless in order to survive. The child's road into the social unity of the family meal may have been delayed or so filled with difficulty that all aspects of participation with others have been very discouraging and unsatisfactory.

The feeding training techniques and attitudes are most important. The child who cannot feed himself should not be isolated from others because this will only hinder the social development of the handicapped child, just as it would the normal child. The atmosphere while eating should always be kept pleasant and unrushed. The child should not be hurried and confusion should be kept at a minimum. The child must constantly be reminded to suck, chew, keep his lips closed and to move his tongue around. The therapist or parents should sit to the undominant side of the child and on his level if possible. (For example, if the child is left-handed, the person assisting him should sit to the right side of the child.) If a mirror does not distract the child, it may aid in maintaining a good posture, head balance, hand-to-mouth motion, lip closure and other skills. A mirror is also a good item to use during the actual feeding skills training time as well as the meal time. The child should always be praised when he succeeds, and the child should never be scolded because he could not control the abnormal movements of his physical disability. A scolding may set training back. Many phases of the feeding training program are best performed during free time or during the scheduled training period. Blowing, sucking, swallowing and chewing are necessary for proper feeding and may be improved by having the child practice. Improvement of all these skills will also help eliminate drooling. For blowing have the child blow bubbles, a toy horn, windmill, whistle, ping pong ball, cotton balls, balloons, paper toys, bubble gum, feathers or harmonicas.

Activities to aid sucking:

(1) The child, first of all, must feel secure to suck effectively. (2) Tilting the child's head forward a bit aids in sucking and light stroking of the child's cheeks with your fingers before and during the feeding should aid sucking. You should always make sure that the child's head is in an upright position, tilted slightly downward. (3) A gentle movement of the bottle or straw up, down and sideways in the child's mouth should help the sucking reflex. (4) The sucking motion of the lips can be encouraged by closing the lips with the thumb

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** Presented at Nutrition Workshop, Child Development Center, January, 1971 and index finger as the spoon is withdrawn from the mouth. (5) Sucking can be stimulated in the young child with various stimuli. For example, the tactile stimuli, which are most effective in producing sucking, are touching directly on the lips, above the lips, below the lips or touching the cheek. The best temperature stimuli to produce sucking is extreme cold. The taste stimuli that is most effective is sugar. Strangely, but true, the odor stimuli which is most effective is ammonia. (6) If the child is fed with a bottle, sucking can be aided by holding the bottle straight in the child's mouth. (7) A child who does not have the sucking idea may learn from resisted sucking. Place a straw in the child's favorite liquid and hold your finger over the hole in the top, thus holding the liquid in the child's mouth. Repeat the process several times so that the child can associate it with a pleasant drink. Then, the end of the straw should be lowered a little below the horizontal so that the liquid will not actually run into the child's mouth, but so that the faintest suction will draw it in. The child should be encouraged to drink ***all*** of his liquids through a straw once he gets the sucking idea. (8) You can produce resisted sucking also by having the patient actively purse his lips. The therapist should then supply resistance to the orbicularis oris muscle around the mouth and the buccinator muscle by grasping the cheeks bilaterally with the thumb and fingers while stretching the lips laterally. (9) Put applesauce in a nipple spoon making the hole large enough to obtain the applesauce but small enough to require maximum effort of sucking. This provides resisted sucking and develops a rhythmic suck, swallow pattern. (10) Always have the handicapped child use a straw when drinking; in order to encourage straw usage, practice by dipping the tip of the straw in honey or any other sweet, sticky substance, and putting it in a liquid and have the child suck. (Candy straws may be used also.) The child will be encouraged to suck with the honey because he will want more of the sweet flavor. The child should be told to close his lips around the straw, and if necessary, the therapist should hold the child's lips together. When training the child in straw drinking, liquids should be thin at first, but as the child improves, thicker liquids such as malted milk can be used. (11) Suckers, candy sticks, sugar bits and popsicles are good mediums to teach and improve sucking skills and are very good ***pre-straw*** activities. (12) The child may be encouraged to try to suck by the therapist smacking and rounding her lips and encouraging the child to smack and round his lips. (13) One can make suction noises with his tongue and try to get the child to imitate him. This will help sucking. (14) Also one can have the child practice sucking on soda bottles. (15) Sucking can be stimulated by using Rood facilitation techniques. We use a battery operated swizzle stick or a vibrator and stimulate the orbicularis oris muscle, which is around the mouth, for a few seconds and then we put ice around this muscle for a few seconds. After doing this it is a good idea to practice straw drinking and other sucking activities. For example, have the child suck on ice after the stimulation. (16) The infa-feeder can also be used to teach sucking.

Activities to aid swallowing:

Often difficulty in swallowing is due to the inability of the spastic tongue to work the food or liquid to the back of the mouth where the end organs for swallowing are located. Swallowing usually improves with effeciency in sucking, but may become slow at first. The child should be encouraged to take very short sips and swallow immediately. (1) The child should practice swallowing with liquids and soft foods that the likes. For example, orange juice, milk, pudding, vanilla cookies, etc. (2) A closed mouth aids in swallowing. Again the child's lips should be held together, if necessary. (3) An upright sitting position is also necessary for swallowing. (4) Quickly stroking the child's throat with ice will induce swallowing. This technique can be used in practice sessions or during the meal. (5) Rood facilitation techniques can also be used to assist swallowing and, if you will refer to the Addenda, where you will see the picture of two faces with specific muscles outlined, you can see the muscles I will be referring to. First of all to encourage swallowing, brush under the chin with the facilitation brush from ear to ear, avoiding the tip of the chin. Next, turn the head completely to one side and brush the long sternocleidomastoid muscle, and then ice this muscle. Ice it three times and brush it two times. Then have the child suck on ice for a moment and then touch the ice to the hollow spot in the center of the base of his neck. This should cause the child to swallow immediately. Repeat this suck-swallow three times and then scrub your fingertips over this muscle. This scrubbing can be used any time during the day to lessen drooling. (6) Gentle stroking of the child's throat with the fingers in an upward direction induces swallowing. (7) The protruberance of the larynx can be gently pinched to induce swallowing or else the cheek can be rubbed with the fingertip. (8) The child should be allowed to feel his throat occasionally when he swallows. This will help him to become conscious of the act of swallowing. (9) One can help teach voluntary swallowing by making sure that the child's head is always in a slightly downward position. The child should never be allowed to tilt his head back when he swallows because this will cause him to gulp and it doesn't teach voluntary swallowing. (10) Heel-pounding of the person in a supine position causes excessive joint compression which activates the midline muscles, especially in the neck, and the muscles activated are the ones involved in swallowing. (11) Again, straw-drinking is a great aid in teaching swallowing.

Activities to aid chewing:

Chewing is a heavy work activity and involves many muscles. (1) Always encourage the child to chew before he swallows. The child may practice chewing with foods that he likes, like soft vanilla cookies; celery; green beans; cooked cereals; meat, cut in small pieces; cheese; marshmallows; gum drops; caramels; bubble gum; etc. (2) Stimulate chewing by placing food on the middle of the tongue with a slight downward pressure of the spoon as food is left on the tongue. This technique will prevent abnormal tongue movements which push the food out of the mouth. (3) Also, a verbal command of "Open" should accompany the use of the spoon. (4) Never put the entire bowl of the spoon inside the dental arch. This precaution will eliminate the child's tendency to close his teeth on the spoon handle, which would prevent him from using his upper lip to remove food from the spoon. (5) One may help by holding the child's lips together while he chews food and also brushing the child's lips with his fingers to close them. (6) Tapping a child under the chin will help to get a reflex closure of the mouth for chewing. (7) Jaw stability is necessary for chewing and again Rood facilitation techniques can be used to aid jaw stability and chewing. Now, if you will refer to the chart; (Addenda) again you will see pictures of these muscles. The procedure is to brush then ice the temporalis muscle, the hollow spot at the temple, and then apply pressure with the fingertips to the muscle. Next brush, then ice the pterygoideus muscle along the cheekbone and under it between the corner of the eye and toward the ear. Then put the thumbs on the chin for resistance. Brush, then ice, the masseter muscle from the center of the cheek at the corner of the gum line downward toward the center of the jaw. Apply some pressure to the masseter muscle by having the child bite on a tongue blade. Brush and ice the orbicularis muscle around the lips again. Brush and ice the sternocleidomastoid muscle which is pictured on the chart also. Give some resistance to jaw closure with the fingers exerting pressure into the masseter muscle with the thumbs on the chin pushing downward. About 20 minutes after this lightly rub each one of these muscles with the fingertips. All of these things should improve jaw stability and thus chewing. (8) Also, chewing can be improved by pressing down on the chin to close the jaw. (9) It may be necessary to push the child's jaw up and down in order to get a chewing action started. (10) Stimulate chewing by pressing back on the chin and firmly rubbing the cheek at the back of the jaw. (11) Show the child how to chew and let him feel your jaw as you chew. Also, the child should feel his jaw as he chews. (12) If the child is not able to put food in his mouth, have him open his mouth wide. Using a tongue depressor, place food well back to the side, between the molars. This will help stimulate chewing. (13) A gum bag, or tea bag with gum inside, attached to a string may be used to practice chewing when there is fear that the child may swallow or choke on gum. The gum inside the bag may be softened in warm water before putting it in the child's mouth. (14) Again, straw drinking will help chewing. (15) In order to strengthen more muscles for chewing, feed the child by alternately entering the food first on the left side and then on the right side of the mouth. (16) Food should not be wiped away from the chin while the chewing and swallowing activity is in process since the child must have his entire mouth free for the process of eating.

Tongue movement is essential in proper eating. Never scold a handicapped child when food is pushed out of his mouth. Never loose patience because the child cannot control the abnormal tongue thrust which causes this. One must constantly remind the handicapped child to use his tongue and to move the food around and to keep his lips closed. There are many exercises that can be done with the child to practice lip closure and tongue control. For lip closure, first of all, (1) closing the lips keeps air from being sucked into the mouth and makes swallowing and chewing easier. (2) The child should use his lips to remove food from the spoon. (3) Never scrape the food off the spoon under the child's teeth because this creates an unpleasant experience and does not facilitate lip closure. Try to prevent the child from associating this unpleasant experience with eating. (4) The food also should not be placed on the child's lips as this will encourage him to stick his tongue out. (5) Rood facilitation techniques can also be used to aid lip closure. Using the facilitation, brush on the orbicularis oris muscle and ice it to help lip closure. After doing the brushing and icing around the mouth, give resistance to lip closure with the fingertips. The upper lip is usually the weakest and to give resistance, press down against the lower lip and up against the upper lip with the finger. It is good to continue this procedure for approximately five minutes before mealtime so as to achieve carryover from treatment. (6) Another muscle to stimulate for lip closure is the buccinator muscle. To facilitate this muscle the patient's mouth is open. The procedure involves pressing inside the cheeks with ice and then resisting the action of this muscle with two fingers inside the child's teeth. The buccinator muscle approximates the lip and compresses the lips in blowing out and in sucking. Tap the insertion of the angular head of of the quadratus labii superior muscle bilaterally, at the lateral upper lip in order to aid in lip pursing by providing pressure around the mouth. (7) Have the child consciously practice lip closure when he is straw drinking or performing any other lip closure activity. Straw drinking, of course, is very good for lip closure, and the child should always be encouraged to keep his lips closed around the straw. If he has difficulty, his lips can be pinched closed with the thumb and forefinger. (8) For lip closure tell the child to kiss the straw or throw kisses to people. (9) Put the sugar, syrup or something sweet on the tip of a straw and place the straw in the child's mouth for lip closure. (10) Have the child hold a tongue depressor or a marshmallow between his lips. (11) Paint the child's lips with lipstick to make an impression on paper with the lips closed. (12) Twirl a candy stick between the child's lips as well as popsicles, suckers or licorice. (13) The child should always be taught to use his lips in these lip closure activities and not his teeth.

Now, for tongue control. The proper place for the tongue when eating is within the mouth, behind the teeth; while sucking, drawn back and slightly grooved; and while swallowing, moving up behind the upper teeth. (1) Food should be placed between the middle and the tip of the tongue with a slight downward pressure. This helps prevent tongue thrust. (2) If the child thrusts his tongue out frequently during feeding press a tongue depressor under his tongue and it will go back into his mouth. (3) Rood facilitation techniques can be used for tongue control. Brush the tongue lightly in the area that it should be placed. For example, if elevation of the tongue is desired, touch the hard palate just behind the upper teeth. Then, ice the tongue for a few seconds and have the child suck on ice for stimulation. Wait for about 10 or 15 minutes before "walking" a metal utensil handle back on the tongue, start at the tip of the tongue and slowly work toward the back. Hold the tongue down momentarily at the back—–release it. Repeat about six times. This will help to eliminate the tongue thrust or hyperactive gag reflex. (4) Also, place peanut butter, marshmallow fluff and other sticky, sweet foods on the roof of the mouth or on the inside of the cheeks and have the child reach for it with his tongue. (5) Dip a tongue depressor in honey or any other sweet, sticky substance and hold it at a distance outside the child's mouth and have him reach for it with his tongue. (6) Another exercise to have the child try is touching his nose with his tongue. (7) And also suckers and licorice sticks may be held about 1½ to 2 inches from the mouth. The child may try to reach for them with his tongue. There are a lot of other more nutritious foods that could be used.

Positioning:

Positioning the handicapped child is very important. The child should never be fed in bed. The handicapped child should sit in a straight chair as soon as possible; and, if he is unable, he should sit in a wheel chair with a lap board; a high chair; or, for more security for the severely involved child, a cutout table. The child must be in an upright sitting position with a minimum of support from the therapist or parent. The child should be taught to hold his head in a slightly downward position, which is the normal head position while eating. Lap feeding is not a good method since it does not leave one's hands free to assist the child in all of the feeding skill techniques. In determining the functional set-up each child should be given individual consideration according to his degree of involvement, associated handicaps, fears, age and social awareness. He must be psychologically prepared for any intensive treatment or special equipment which may cost him temporary inconvenience or set him apart from his peers. A functional position is very important. In the Addenda, directions are provided for measuring a child for a chair. The height of the child's chair depends upon the distance between the sole of the child's foot and his flexed knee. The depth of his chair seat is measured from the crease of the flexed knee to the back of the buttocks. The width is taken across the hips with an allowance made for braces when necessary. The back of the chair should be perpendicular to the floor, and the table and chair should meet the needs of the individual so that his elbows are even with the table top and his feet are placed flat on the floor or are supported by a foot rest. Tremor athetoids and tremors seem to perform much better at an even higher table with a straight edge against which to stabilize their forearms. The child should be stabilized by restraints to the feet, legs, arms, hands, when excessive involuntary motion is present. Many methods for stabilization can be improvised; the type used should be especially designed to meet individual needs. The restraints can be binders, sandbags, or straps. The child may need support for the trunk (for example, a posture jacket), and he may need head rests, helmets and supports for the head in order to maintain a good sitting position. Head supports may be necessary to eliminate excessive motion and to hold the head in the proper position. A posterior-type head support will aid in the elimination of extensor thrust, and the curved or barber-type rest will give added lateral support. Support to the head is very important. If the child's head is supported by the therapist's hand rather than a device, the head should be supported by holding it at the base of the ears or on top. One should never support the head by holding it at the back because this causes the child to push his head back against the hand and the purpose is defeated. Footrests of adjustable heights, with or without restrainers like heel plates, straps, etc., on the feet are often indicated. If the child pushes back, a strap may be placed in back of the child and attached to the table to hold his chair in place. As relaxation improves and confidence is built-up, there should be a lessening of overflow and grimacing, which adversely affects the performance and leads to undesirable habit patterns. It is wise to keep adapted equipment at a minimum, thus approximating normal conditions.

There is a certain progression that is followed in self-feeding, but self-feeding has many prerequisites. The child should nave: (1) head and trunk control, (2) the ability to remove food from the spoon with the lips, (3) the ability to bite, chew, suck and swallow and use the tongue, (4) the ability to sip and take liquids, (5) sufficient upper extremity control to bring the hand to the mouth, (6) eye-hand coordination, and (7) grasp. Although the child does need these pre-skills in learning to feed himself, it is not necessary that all seven be mastered because some of the skills can be accomplished with special equipment or through practice. However, the child should be making some attempts at all seven, with or without equipment. A severely handicapped child may be unable to grasp, but with a special device (Palmar band, splint) he may have no need to grasp. One may have to provide directional training in activities during training time to improve finger, hand and arm functions when a child's upper extremities are physically involved. These activities are designed to duplicate desired feeding motions, to develop a conscious control of movement and a kinesthetic sense of position. In adapting pre-feeding activities the therapist should always remember to have the child use grasp, release, placement, hand-to-mouth motion and other motions that are used in feeding. The principles of rhythm, relaxation and motivation through pleasure and success are very important.

There are many combined motions that are good for directional training. These motions involve many different sets of muscles and activities. (1) Taking apart and putting together toys for controlled grasp, release, wrist deviation and forearm motion. (2) Playschool shape toys, dropping beads, piling blocks, throwing balls and bean bags for grasp and retention, (3) decorating and undecorating a wooden spool tree or a vertical peg board which requires release and grasp at different heights, (4) playing tic tac toe or checkers for controlled elbow, shoulder and finger motions. (5) Developing grasp of various sizes of geometrical forms with the playschool toys. (6) Releasing a small toy or bead placed in the child's hands and having the child carry this over a series of boxes. (7) Lacing cards, lacing beads, leather lacing (in all activities such as this the child should pull the string toward his mouth). (8) Grasping and lifting pegs from a peg board and then carrying pegs to the mouth, returning and releasing them in the peg board. Motions of the wrist and supination and pronation are involved. (9) Placing a bead in the child's hand and then having the child open the hand and supinate the hand to see the color. (l0) Hammering to develop a steady and accurate wrist motion and placement. (ll) Drawing with a crayon with or without assistance and completing the drawing before releasing the crayon or pencil from the paper. (12) Braid weaving with the frame in a horizontal position using a spoon as the weaver. There are many gross directional movements that are good. Examples include: (a) coloring large outlined areas using gross side to side, push-pull and circular motions as in finger painting to encourage rhythm and relaxation. (b) Pushing objects on a table and into stalls with the forearm pronated or supinated. (c) Smoothing large pictures to which paste has been applied with the wrist and fingers extended. (d) Making gross side to side, push-pull and circular motions in a sandbox to encourage rhythm and relaxation.

Horizontal adduction (bringing the arm toward the body) is used in feeding. This motion can be practiced by: (1) having the child hit a ball suspended from the ceiling toward himself or (2) knocking down a pile of blocks in a position where feeding utensils may later be placed.

For developing ***horizontal abduction***, (moving the arm away from the body) activities may include: (1) knocking a ball from the table and moving the arm along the table to the side or (2) hitting a ball outward as it is suspended from the ceiling.

For elbow ***extension and flexion,*** with some associated shoulder movements, one may have the child: (1) climb steps of graduated heights with his fingers and then knock small articles off the steps at each level for hand-to-mouth motion. Usually one inch steps are used at first and then the height of the steps is increased as the child's skill and range of motion improves. (2) Play the target game, where the child brings his hand down on a paper target while aiming at the center. The target is placed in the normal plate position.

(3) Dropping beans in a small jar placed in the normal plate position. (4) Woodworking activities with adapted equipment. (5) Striking a ball or bead suspended from the ceiling on a string and bringing it to the mouth. (6) Hitting drums, bells, a xylophone, etc., with a mallet.

For ***grasp and release*** activities include: (1) finger puppets, (2) squeezing clay, yarn ball, wet sponge or a rubber ball. (3) Holding toys, objects, balls, rattles and different types of tactile materials with different textures. (4) Clapping. (5) Shaking and stacking the hands. (6) Utilizing finger place in hand games. (7) Also, having the child release objects on request within a specified area.

A good progression for independent feeding is outlined below:
(1) teaching the child to blow and suck, chew and swallow, (2) teaching the child to use his lips and tongue, and have the other physical capabilities previously mentioned, (3) independent feeding. The child may have difficulty with certain steps due to his physical disability or he may need special stimulation due to his level of retardation or deprivation. The child must have a good ***hand-to-mouth motion:*** this is the ***first step.*** A good hand-to-mouth pattern can be encouraged and developed in feeding skill training by having the child use foods that he likes; for example, have the child dip his finger in frosting, whipped cream, colored cream cheese, jam, peanut butter, honey, marshmallow fluff, cake batter, etc., and then place his finger to his mouth. Initially, the child's hand may need to be guided and he may need continued encouragement or help physically. Also, bubble-blowers, whistles, harmonicas, plastic windmills, etc., are good things to encourage a hand-to-mouth motion. If the child is unable to hold these objects due to poor muscle strength or coordination, the objects can be taped to his hand with masking tape. Free movement is important at the shoulder joint, but often the shoulder girdle may require stabilization by cupping one hand over the physically handicapped child's shoulder and then guiding his arm at the elbow. Repetition, gentle encouragement, providing just enough but not too much help and knowing when the child does not need help are very important in the development of appropriate skills.

The ***second step*** occurs when the child learns to take food, unassisted, to his mouth with his fingers. Finger feeding can be encouraged by giving the child finger foods easily handled; such as, toast, bacon, bits of meat, banana slices, cheese, graham crackers, cookies, orange slices, gum drops and other foods. Also, bubble blowers and windmills may be used for this step. A device such as the sandwich holder (Addenda) will come in under this area of hand-to-mouth motion or grasping.

The ***third step*** can be started when a good hand-to-mouth motion and finger feeding have been achieved through training activities; the spoon is introduced here. The child has accomplished the ***third step*** when he can pick up the spoon from the table without help. This skill will be aided by the pre-spoon activities of finger feeding. The spoon should be placed within the child's reach, and he should be encouraged to use it. In the beginning it may be necessary to eliminate food until ease in a new situation is established. If a weak grasp is present, a built-up spoon handle will help. Built-up spoons may be purchased commercially or they may be adapted with bicycle handles, dowels, knobs, spools, sponges, solder, plaster of paris, etc. (Pictures of adapted spoons are included in the Addenda.) If grasp is very poor, a splint or band may solve the problem (see Addenda for description). The palmar band just fits around the palm and has an insertion pocket for a spoon. A splint would be used to provide palmar support and would also have an insertion pocket for a spoon. This would be used when grasp and wrist control are very poor. If range of motion or the amount of movement in a joint is limited, a spoon with an extended handle would be helpful. These extended spoons also may be purchased commercially or adapted with a dowel or piece of plastic or metal.

Limited supination or pronation of the forearm or a tendency for the child to tip the spoon before it reaches the mouth could be solved with a swivel spoon. This spoon bowl always stays level so the child doesn't spill his food.

At the ***fourth step,*** the child is able to bring the spoon to his mouth. This step will have been aided by the pre-spoon training activities. Hand-to-mouth motion can be encouraged and practiced by having the child dip the spoon in honey and other foods and by having him put the spoon to his mouth. Again, the child's hand may require guidance initially.

In ***the fifth step***, the child is able to fill the spoon with food, without help, and feed himself independently. Spoon feeding can be practiced with foods that stick to the implement like cooked cereals, rice pudding, jam, mashed potatoes, desserts, mashed bananas, applesauce, etc. The child's coordination may be so poor that his plate or bowl will not stay on the table, and he may be unable to get the food on his spoon. Suction cups, holders, cutouts, and a lap board with openings to fit bowls, weighted bowls, plaster molds to hold bowls or plates, rubber mats, clay on the bottom of a dish or a wet turkish towel wedged around the dish are means of stabilizing dishes (see Addenda). Scraping food off the plate can be made much easier for the handicapped child with the use of a plate guard. This is just a guard that fits around the plate and allows the food to be pushed up against it as the food is removed from the plate.

For ***the sixth step,*** the child is able to use a fork and spear food without help. One may practice the use of a fork by having the child spear bread covered with peanut butter or thickly sliced meat cut in cubes. Forks can be adapted very similarly to spoons. A fork may have a built-up handle for weak grasp or extended handle for limited range of motion.

At ***seventh step,*** the child is able to pick up and release the spoon or fork as needed and feed himself independently with each utensil.

In ***the eight step,*** the child can grasp the cup and drink from it unassisted. Initially, in teaching the child how to use the cup, it is good to use a paper cup or a soft plastic glass. The cup should be squeezed to form a pouring spout and then a small amount of liquid (the amount should not exceed one teaspoon) should be poured into the corner of the child's mouth. The child's head should be kept in an upright, slightly downward position, and the child shouldn't be permitted to tilt backward. The liquid should trickle down the inside of the child's cheek and shouldn't choke him. Milk can be offered in this manner. When the child starts to mouth the cup, it should be given to him in the middle of his mouth. The cup should be held level with the child's mouth and should be placed on top of the tongue, slightly behind the teeth. The child should be encouraged to sip the liquid, swallow and sip again. One should be careful not to pour the liquid rapidly down the child's throat as this would cause him to gulp rapidly and choke. As the child shows an interest, he should be allowed to hold the cup. This can be encouraged by placing the therapist's fingers over the child's hand as he holds onto the cup. It is also good to have the child use a cup with a handle. Some physically handicapped children may have great difficulty in holding a cup. The cup with a weighted bottom and a top may solve the problem of both holding the cup and preventing spills. Also drilling a hole in the top of a cup such as the ***"Tommie Tippie"*** is often recommended. A child with very poor coordination can become independent in drinking by use of a glass holder with an adjustable angle. This device can be adjusted according to the child's position. Straws can be adapted in a variety of ways (see Addenda for illustrations).

In ***the ninth step,*** the child should work for the easy use of all of his utensils and the cup as well as a good appearance to the observer. A mirror may help a lot here by getting the child to see for himself what needs improving. The child should be encouraged to help clean up as much as possible after meal time.

At ***the tenth step,*** after doing well in all the above steps, the child is ready to master the use of a knife for spreading and cutting. A special rocker knife may have to be used for cutting meat when the child only has the use of one upper extremity.

Finally, it must be emphasized that, the final goal is not the same for all children because the inability to meet a certain norm should not be a factor in the feeding skills training.

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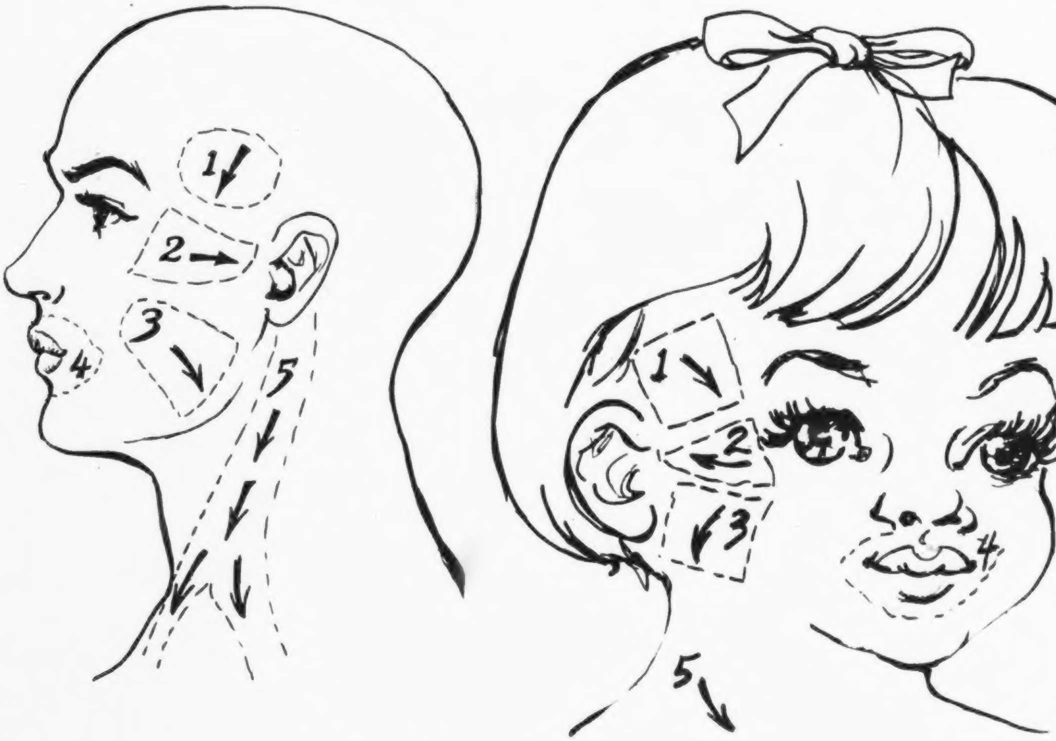

MUSCLE AREAS:

1. Hollow spot at temple; temporalis.
2. Along cheek bone and under it, between corner of eye and toward ear; pterygoideus.
3. From center of cheek at corner of gum line, downward toward corner of jaw; masseter.
4. Around lips; orbicularis.
5. From just behind ear to collarbone; sternocleidomastoid.

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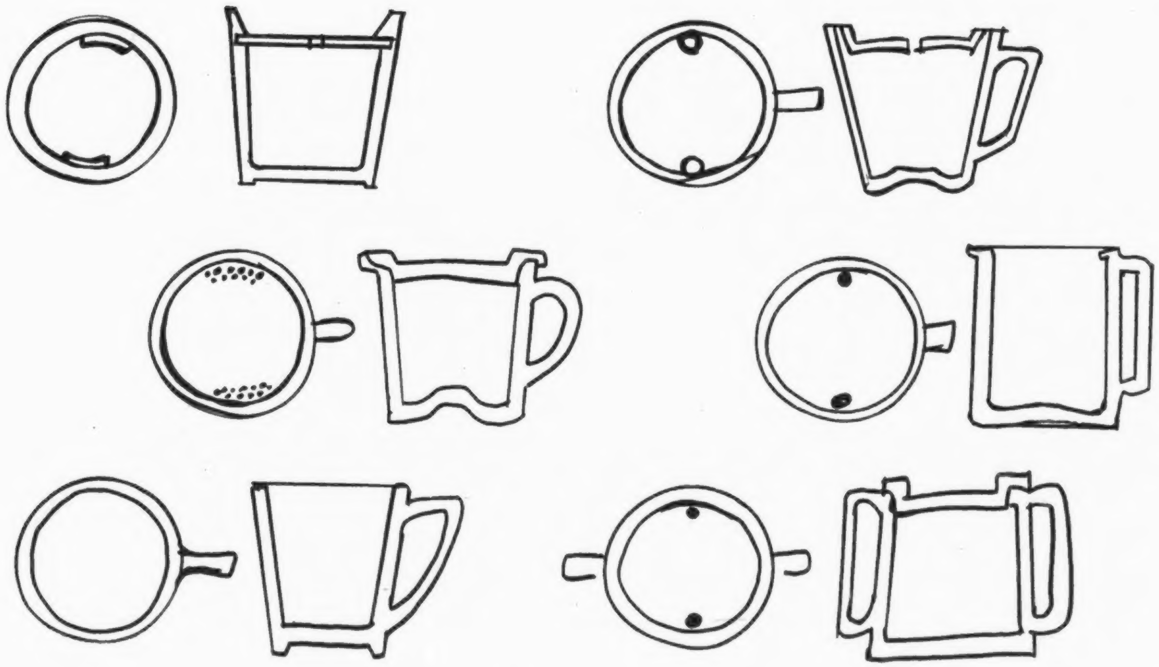
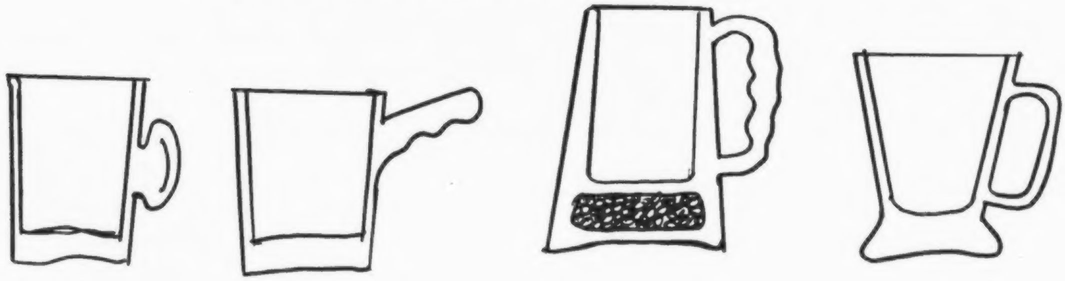
1967. Mimeographed materials. County of Los Angeles Health Department, Los Angeles, California

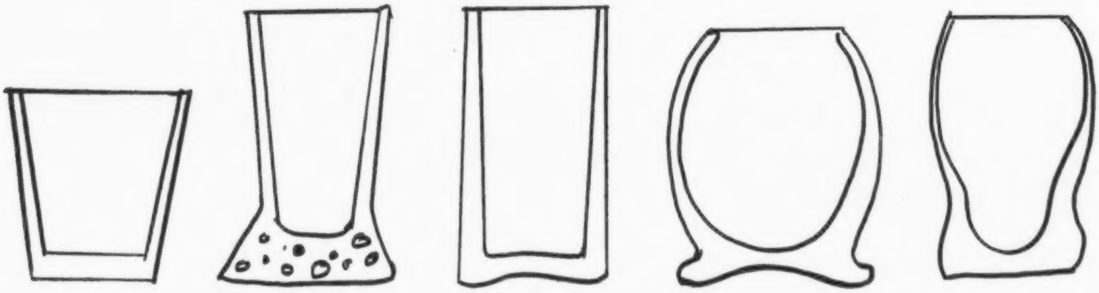
COMMERCIAL TRAINING CUPS WITH LIDS



ADAPTED HANDLES ON WEIGHTED CUPS

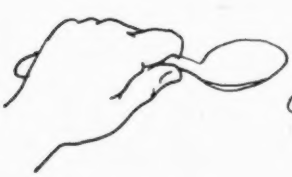


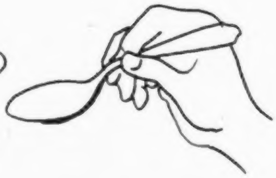
DRINKING GLASSES



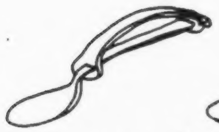
ADAPTED SPOONS

PALMER GRASP

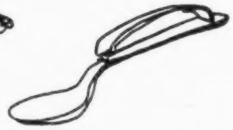




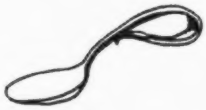
CONVENTIONAL GRASP



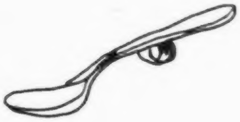
Strap of leather or rubber over back of hand



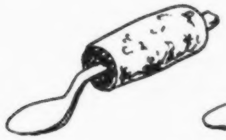
Metal bar for palmar



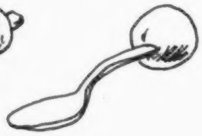
Iced teaspoon, handle curved back and under for palmar grasp



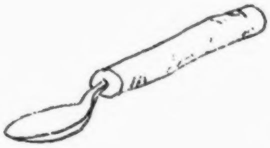
Ring fastened to back of handle through which middle finger fits



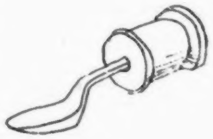
Sponge rubber handle



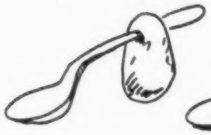
Ball or knob-shaped handle



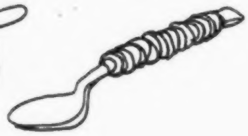
Extended dowel handle



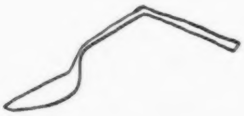
Spool handle



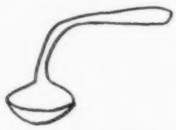
Padding for stability in conventional grasp



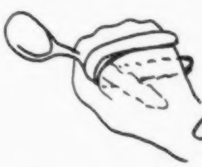
Handle weighted with solder



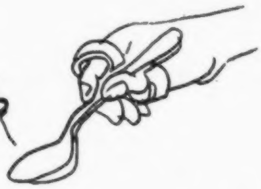
Bent handle for flexion, extension difficulty



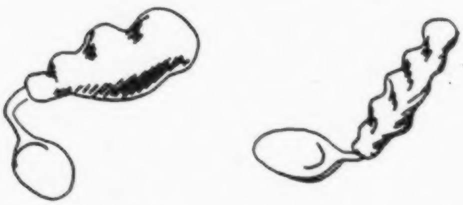
Bent handle for pronation, supination difficulty



Plastic clip for palmar grasp

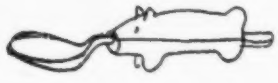


Plastic clip for conventional grasp

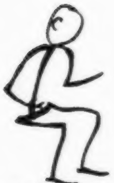


Handles formed from plaster of paris or aire-cast and coated with acetone-plastic solution

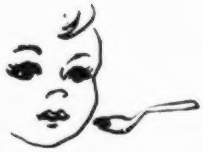
Wooden animal for motivation-use of palmar grasp



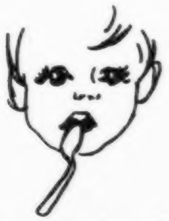
FEEDING TECHNIQUE



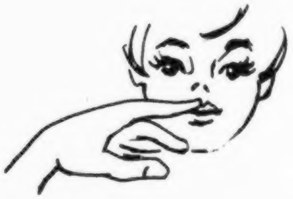
1. Body and head stabilized
Hips and arms flexed.
Head tilted slightly forward.



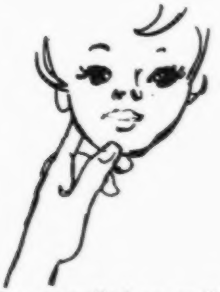
2. Food on tip of spoon.
Present spoon horizontally
to center of lips.



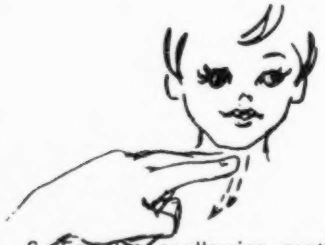
3. Place spoon on midportion of
tongue and press down lightly.



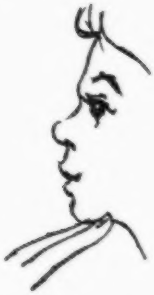
4. Slowly remove spoon and, if
necessary, manually close lips
with fingers and, again, if
necessary, hold closed.



5. Jaw can be controlled manually
with fingers at chin, under
chin and at mandible.

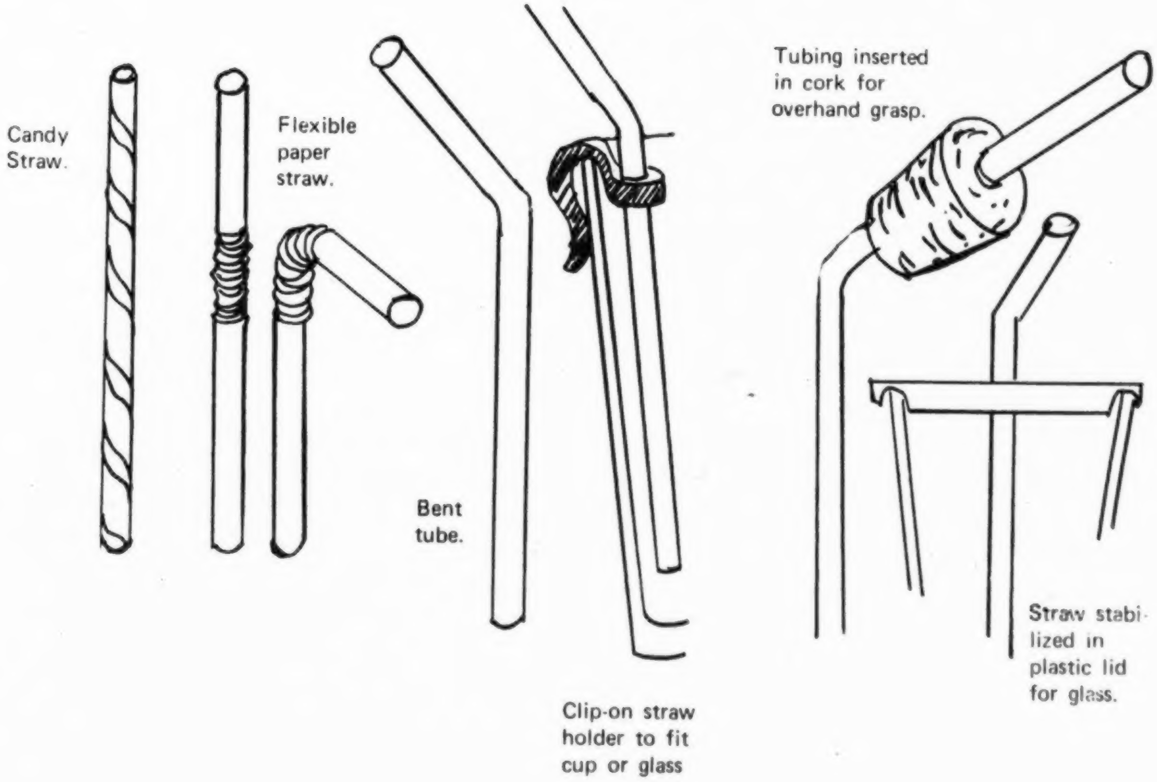


6. For slow swallowing, gently
stroke throat upward or
press at root of tongue.

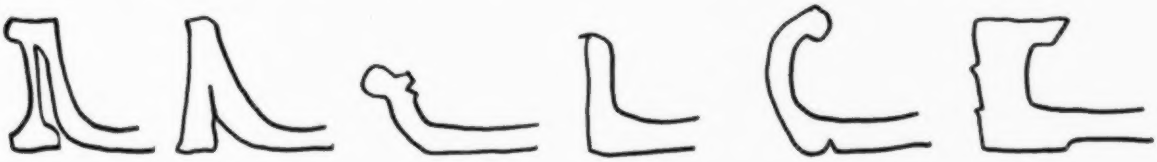


7. For tongue thrust, press at
root of tongue, position jaw.

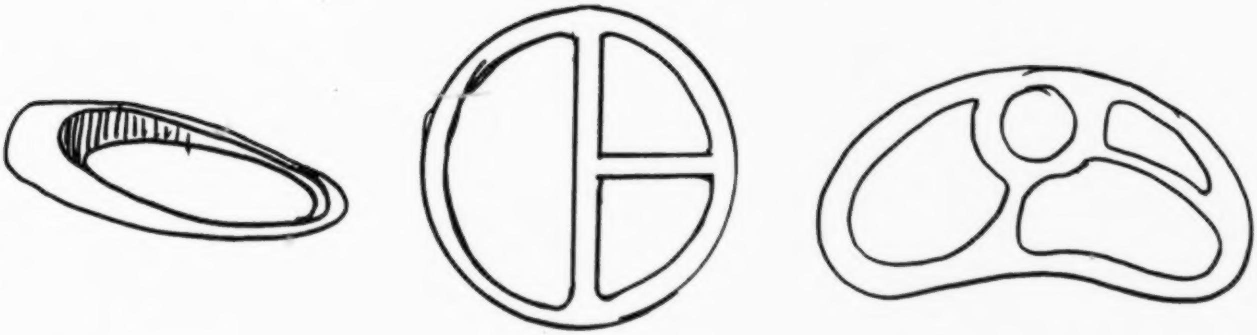
COMMERCIAL STRAWS AND ADAPTED STRAWS


Candy Straw.
Flexible paper straw.
Bent tube.
Clip-on straw holder to fit cup or glass
Tubing inserted in cork for overhand grasp.
Straw stabilized in plastic lid for glass.

TYPES OF UNDERCUTS AND SIDES ON COMMERCIAL FEEDING DISHES



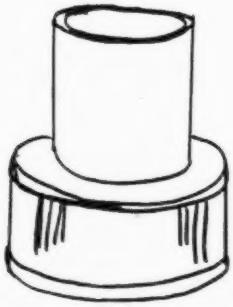
TYPES OF FEEDING DISHES



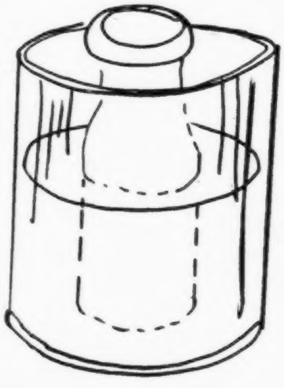
Methods of stabilizing dishes

1. Plaster mold
2. Rubber mat placed under dish
3. Clay on bottom of dish and adhering to table
4. Suction cups attached to bottom of dish
5. Cut out board with openings to fit dish, clamped to table
6. Wet turkish towel wedged around dish

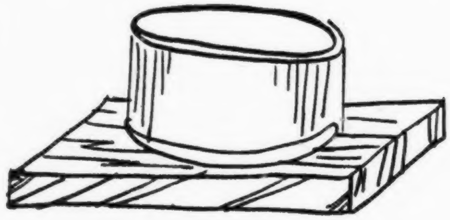
GLASS, CARTON AND BOTTLE HOLDERS



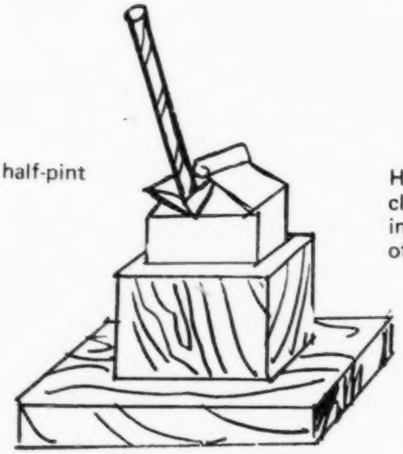
Glass set in tuna can filled with plaster for stability.



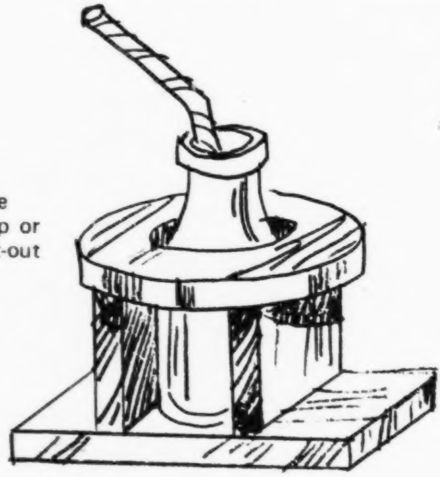
Number 2 can with plaster fill for greater stability.



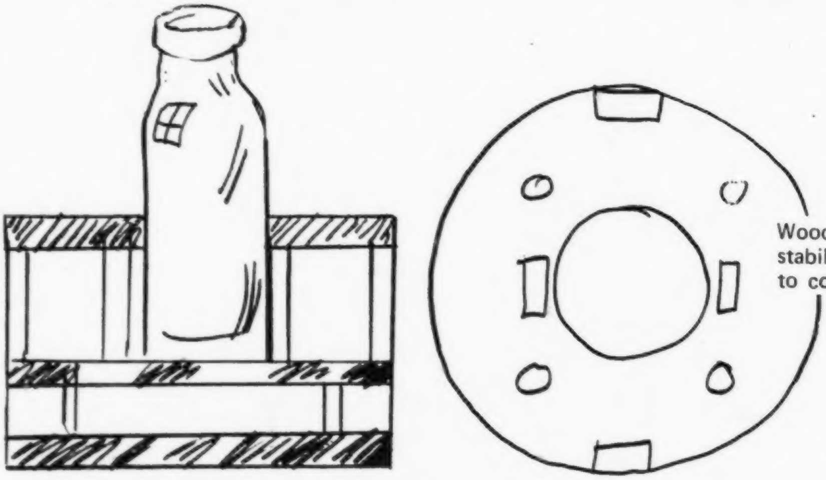
Tuna can mounted on wooden base.



Box to hold half-pint milk carton.

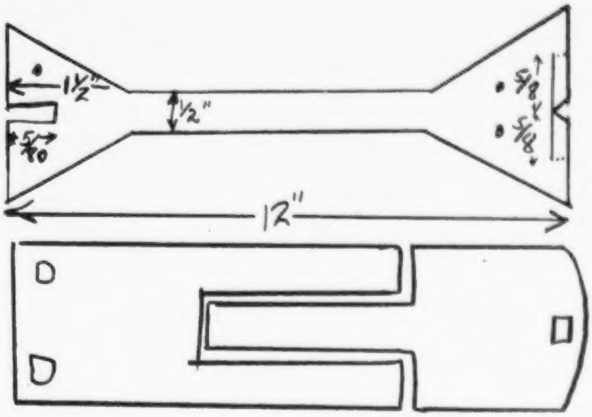


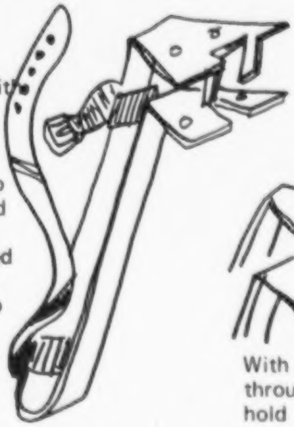
Holder which can be clamped to table top or inserted through cut-out of feeding board.



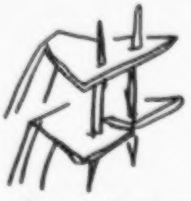
Wooden milk bottle holder to stabilize bottle and raise it to correct height.

SANDWICH HOLDERS



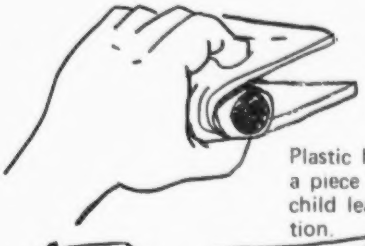


Plastic holder with prongs bent perpendicular to hold food in place. Strap used for child unable to maintain grasp.

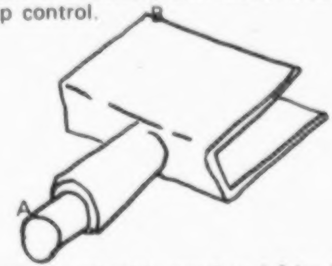


With tooth picks through holes to hold food in place.

Holders used to give a degree of independence in the feeding situation for children capable of necessary arm motion, but incapable of adequate grasp control.

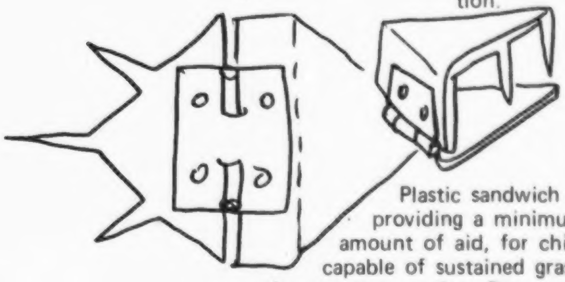


Plastic holder hinged over a piece of doweling for child learning opposition.



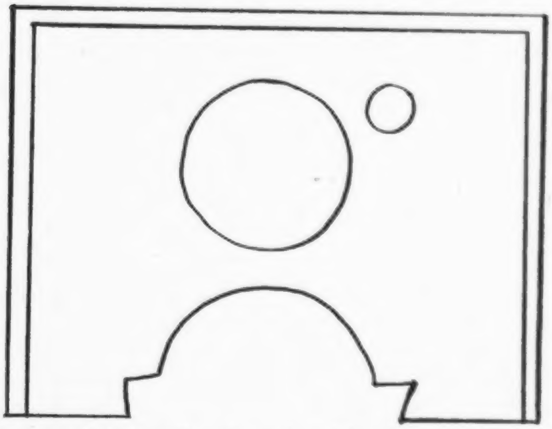
Plastic sandwich holder constructed with guard and false back.

When child pushes Part A (the false back against table top) the sandwich is moved further out from between guard B. This enables him to eat entire sandwich independent of readjustment.

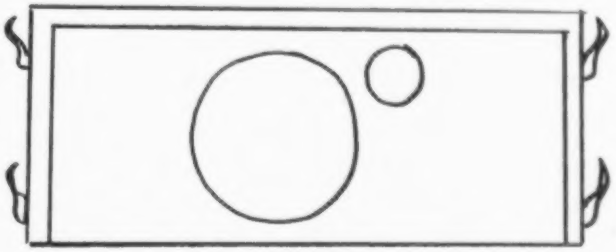


Plastic sandwich holder providing a minimum amount of aid, for child capable of sustained grasp, adequate arm motion. Prevents squeezing and breaking of sandwiches.

FEEDING BOARDS WITH CUTOUTS

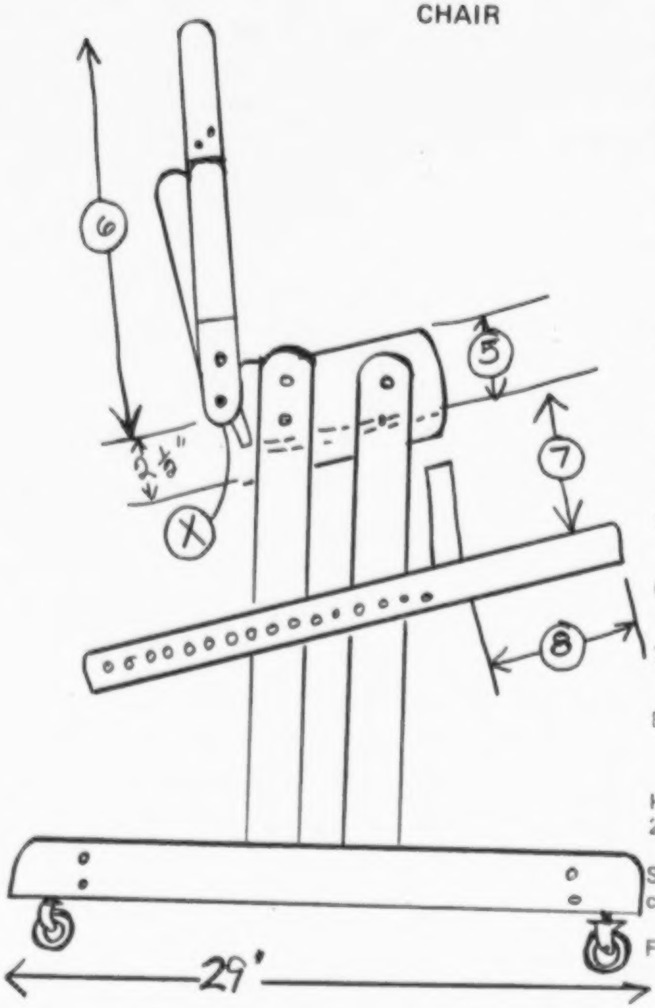


Removable feeding board, with cut-outs for dish and cup or glass. Board fits securely onto table top by means of small dowels which fit into holes in each corner.



Cut-out board which may be hooked onto single table or at individual places at group table.

CHAIR



POSITION FOR TAKING MEASUREMENTS

Sitting over edge of table with feet hanging down, knee at right angle and trunk erect, calf of leg back to edge of table

1 WIDTH OF SEAT

Outside distance from hip to hip

2 EXTRA SIDE BOARDS

Allow 3 inches over measurement 1 for growth. Place a 1 inch and ½ inch side board on both sides

3 DEPTH OF SEAT

Distance from back of hip to 1 inch back of knee.

4 HEIGHT OF BACK REST

Distance from bottom of hip to center of shoulder blades

5 HEIGHT OF SIDE BOARDS

Distance from top of hip bone to chair seat

6 HEIGHT OF UPRIGHT FOR HEAD REST

Distance from 3 inches above head to point "X"

7 CHAIR SEAT TO FOOT REST

Distance from back of knee to bottom of foot

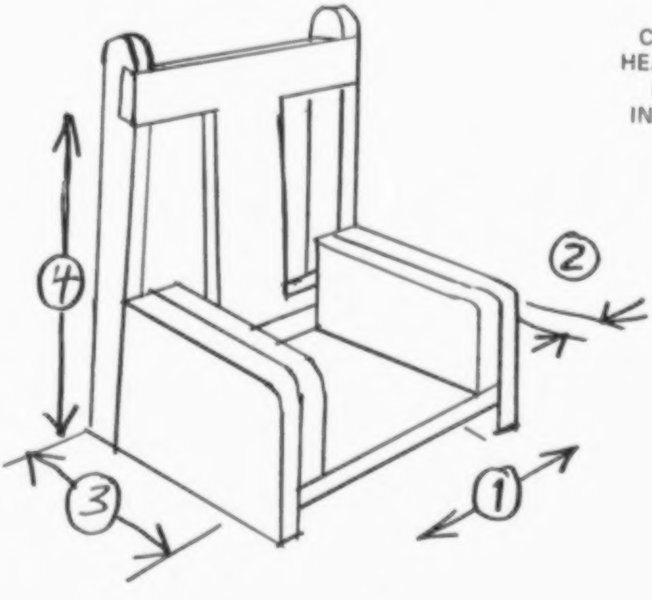
8 DEPTH OF FOOT REST

Length of shoe plus 3 inches, for baby. Increase for older children

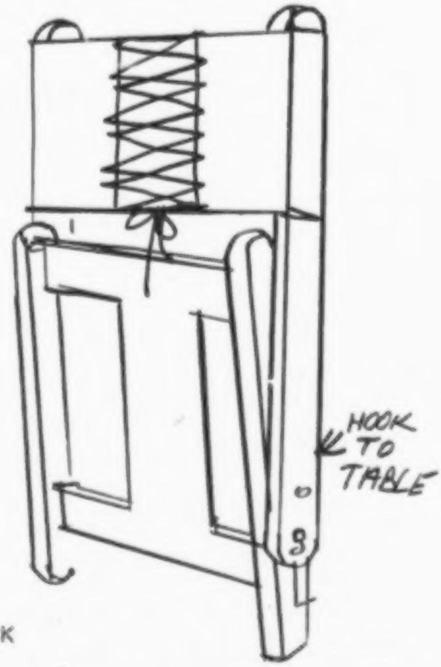
Height of chair seat from floor is approximately 25 inches, for baby

Soft wood 3/4 inch thick is strong enough for chair for baby

Foot rest is set at same angle as chair seat



CANVAS
HEAD REST
LACED
IN BACK



BACK

Kitty Roberts Coffey, M.S., R.D. *
Joy Crawford, R.D. **

NUTRITION PROBLEMS COMMONLY ENCOUNTERED IN THE DEVELOPMENTALLY HANDICAPPED***

Introduction

During the period of July 1, 1968 to June 30, 1969, the Nutrition Department of the University of Tennessee Affiliated Child Development Center, University of Tennessee Medical Units, Memphis, Tennessee, conducted nutrition screenings on 199 children. All of the children were referred to the Center because of suspected developmental delay and all were under 18 years of age.

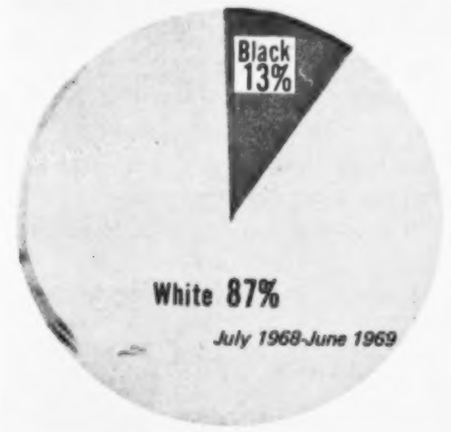


Figure 1

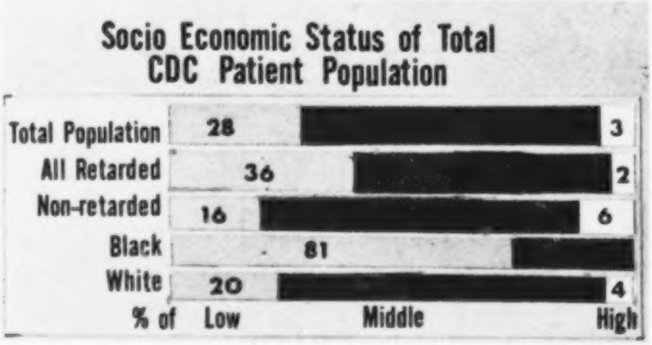


Figure 2

Of the 199 patients screened by the nutrition department, 173 (87%) were white and 26 (13%) were black (Figure 1). Using three categories and the criteria of the Warner Scale (1) 28% of the total population fell into the low socio-economic group, 69% into the middle group, and 3% into the high group (Figure 2). Greater than one-third of the mentally deficient were from the lower group whereas less than one-fifth of the intellectually normal were from the lower group. Eighty-one percent of the black population, as opposed to 20% of the white population, fell into the lower group.

---

[*] Nutritionist, Child Development Center, University of Tennessee Medical Units, Memphis, Tennessee

[**] Registered Dietitian, St. Joseph's Hospital School of Nursing, Memphis, Tennessee

[***] Adapted from audio-visual lecture presented at Nutrition Workshop, Child Development Center, June, 1969

Although all of the 199 patients screened by nutrition presented some type of developmental problem, 83 (42%) were found to be intellectually average or above and 116 (58%) were diagnosed as mentally deficient (Figure 3).

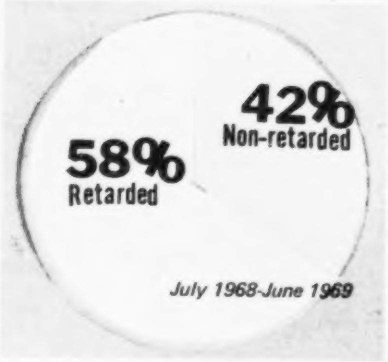


Figure 3

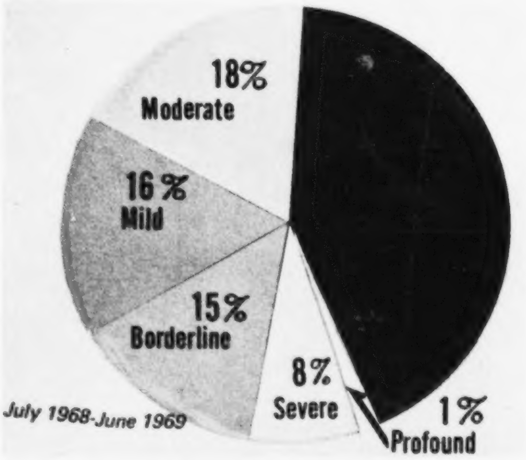


Figure 4

The majority of the retarded were somewhat more or less equally distributed between borderline, mild, and moderate classifications (Figure 4). Fifty-four percent of the white population as opposed to 85% of the non-white or black population were found to be retarded (Figure 5).

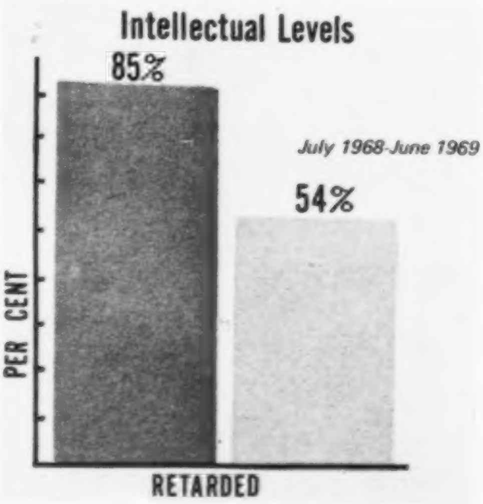


Figure 5

The nutrition screening consisted of observation of the child, interview with the parents, and evaluation of the diet and nutrition status from the history and 24-hour food recall; if, for any reason, the screening suggested the presence of a nutrition problem of any kind, a complete nutrition evaluation was done. The latter included:

a) Body measurements (height, weight, head circumference)
b) Hematocrit
c) Urine screening for amino acids and sugars
d) Detailed diet history
e) Calculation of three-day food records and comparison with the 1968 National Research Council's Recommended Dietary Allowances (NRC-RDA)
f) Observation of child in a feeding situation.

During the period of the survey, the nutrition department conducted complete nutrition evaluations on 112 (56%) of the 199 children screened. These 112 patients represented 43% of the non-retarded and 66% of the retarded children (Figure 6). Moreover, the 112 patients consisted of 58% of the white and 46% of the black children screened. Practically all (92%) of the 12 black patients fell into the lower socio-economic group with none in the upper group, whereas the great majority (74%) of the 100 white patients fell into the middle group with 23% falling into the lower group and a small 3% into the upper group (Figure 7).

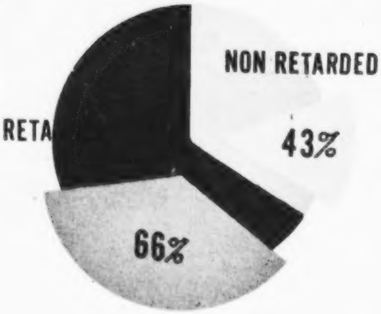


Figure 6

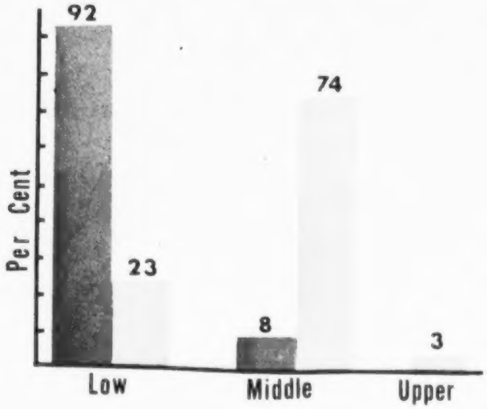


Figure 7

Imbalance of Body Weight

Imbalance of body weight was one of the most frequent nutrition problems encountered among the population in that 35% of the patients were either overweight, underweight or obese (Figure 8). For diagnostic purposes, body growth or size was classified in the following manner using the Iowa Grid as a guideline:

Underweight - 15% below the norm for height and age.
Overweight - 15% above the norm for height and age.
Emaciation - 25% below the norm for height and age.
Obesity - 25% above the norm for height and age.
Growth Retardation - all children whose heights fall below 1 standard deviation of the norm.

Weight Status of CDC Patients

% of	Underweight	Average	Overweight	Obese
All	24	65	7	4
Retarded	28	64	5	3
Non-retarded	17	66	11	6

Figure 8

Obesity and Overweight

It is a well-known fact that childhood obesity may be a forerunner of adult obesity, diabetes, atherosclerosis and other degenerative diseases and that mortality increases with obesity. Eleven percent of the Child Development Center population was found to be overweight or obese (Figure 8). Why this childhood obesity? Was its etiology increased caloric intake, decreased caloric output or was it neurologic, hormonal or perhaps enzymatic? In practically every case of overweight and obesity, the etiology was thought to be increased caloric intake and/or decreased caloric output.

The obese child, whether mentally retarded or not, can be characterized as a handicapped child, both physically and emotionally. Often children do not become conscious of weight status until they reach the adolescent period. Such was the case of D.C. (Figure 9), a 15-year-old moderately retarded, Caucasian female, who weighed 159½ pounds and was 62¼ inches tall when she was first seen at the Child Development Center. D.C. had long imitated the appetite and food patterns of her elders. As a child she ate five and six hamburgers at one time. Her family enjoyed huge meals, high in starch and fat, and so did she. In other words, D.C. was an example of obesity due principally to non-neurotic, culturally patterned overeating. However, when she was 15 years old she became weight conscious and decided that she wanted to work with the Child Development Center nutritionist on a weight reduction program. Within an 18-month-period D.C. (Figure 10) lost 30 pounds.

160
150
140
130
120
110
100
90
80
70
60
50
40
30
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30

Figures 9 and 10

A second case of obesity is that of M. G. (Figure 11), a 14-year-old borderline retarded Caucasian female, who came to the Child Development Center measuring 62¼ inches tall and weighing 199¾ pounds. M. G. led a very sedentary life, her only activities being watching television and singing in the church choir. M. G. refused to do any work, e.g. when told to wash the dishes she hid them under the bed. In short, M. G. was an example of obesity due in part to increased caloric intake but primarily due to decreased caloric output.

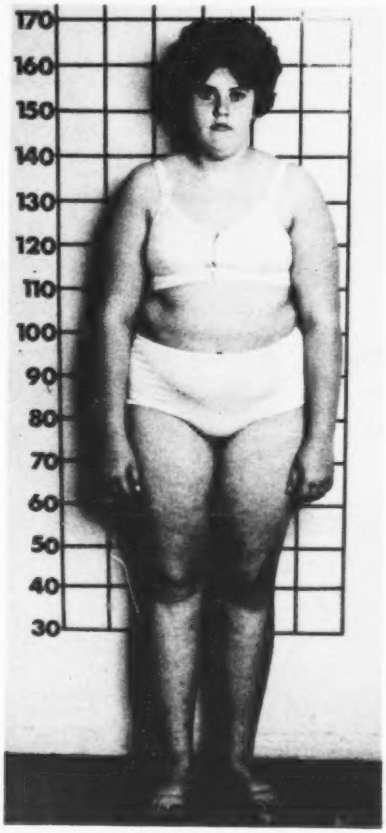


Figure 11

Underweight

Of the patients screened during the indicated fiscal year 24% were underweight (Figure 8). During this period no patients were seen who were emaciated, although emaciated patients had been seen during the previous fiscal year. Underweight, or its more extreme form emaciation, may be due to many factors--among them malabsorption, food deprivation or appetite depression. Extremely hyperactive or cerebral-palsied children may be emaciated because they are unable to take in sufficient calories to meet their needs.

A case example of underweight is C.J. (Figure 12), a five-year-old profoundly retarded Caucasian female. C.J. suffered from vomiting and chronic diarrhea with three to six large, loose stools per day. Food records for this patient indicated that she was receiving adequate amounts of all nutrients but was unable to utilize them in building body tissue.

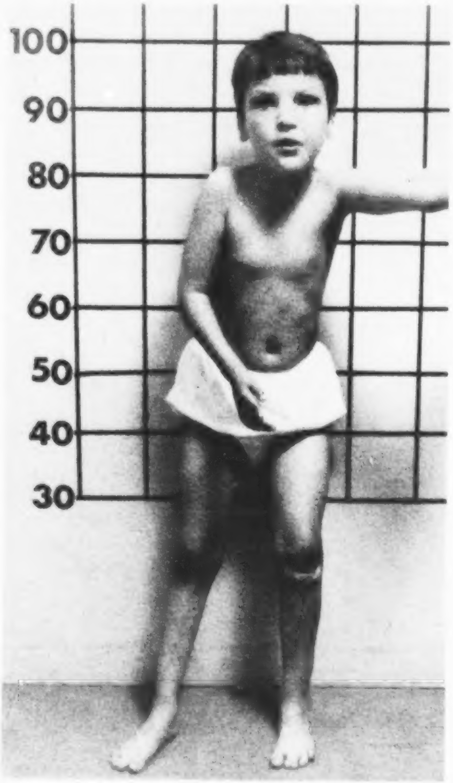


Figure 12

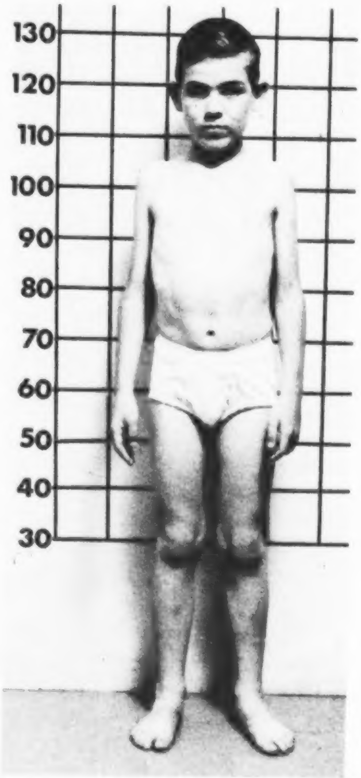


Figure 13

A greater portion of the retarded children were underweight; whereas, a greater percentage of the non-retarded children were overweight or obese (Figure 8). Perhaps this can be explained in that many of the retarded received insufficient calories due to mechanical feeding difficulties or feeding skill delay. On the other hand, many of the non-retarded were seen for emotional problems interfering with learning and perhaps manifested obesity as one result of these psychological problems.

Growth Retardation

Twenty-six percent of the patient population screened by nutrition were growth retarded. A typical example of nutritional deprivation, subsequent underweight and growth retardation is the case of J.S. (Figure 13), a 10-year-old mildly retarded male Caucasian. His natural mother had a very poor diet during pregnancy consisting of only grease-gravy and bread and received no prenatal care. Due to the poverty-stricken condition of the family, J.S. was born at home without medical attention. Milk was not available; therefore, he was fed sugar-water for the first few weeks of life. At the age of one month J.S. was found and hospitalized in a severe state of malnutrition. When released from the hospital he was adopted by an older sister who has cared for him well since that time.

Malnutrition

Another commonly occurring nutrition problem seen at the Child Development Center was malnutrition, which is defined as the inappropriate intake of specific nutrients as judged from calculation of three-day food records kept by the parents. Daily intakes of nutrients and/or calories are considered deficient if they are below

50% and marginal if below 66 2/3% of the National Research Council's Recommended Dietary Allowances for sex and age. An exception is iron which is considered deficient if it is ***below*** the NRC-RDA as there is no safety factor for this nutrient. Daily intakes of calories twice the recommendation of the NRC-RDA and intakes of vitamins A and D three times the NRC-RDA are considered excessive.

Of the patients who were given complete nutrition assessment, 43% were found to be malnourished according to the above definitions. Twenty-five percent of the retarded and 19% of the non-retarded were malnourished. The incidence of malnutrition is believed to be a modest estimate since parents served as informants and perhaps minimized dietary inadequacies. Nutrients most often limiting were vitamins A and C, iron and calcium.

Perhaps one of the most severe cases of malnutrition is that of R.W. (Figure 14), an eight-year-old Caucasian female from a public welfare family who came to the Child Development Center after having had complete but unproductive endocrine and genetic workups for short stature and growth retardation. Three-day food records kept by the mother revealed a monotonous diet consisting almost exclusively of biscuits, bacon, pinto beans, potatoes and chocolate syrup. The food records were calculated and found to be deficient in every nutrient for which there is an official dietary recommendation.

In view of the extremely poor diet these additional laboratory tests were ordered: vitamin A, carotene, folic acid, bone age, complete blood count, total iron binding capacity, total protein, serum creatinine and blood urea nitrogen. Bone age was six years, three months or 2 σ from the mean--supporting the diagnosis of significant growth retardation. Although serum vitamin A was low, indicating low stores of that nutrient, all other values were within acceptable ranges.

Food stamps were suggested to R.W.'s parents, but because of their poverty-stricken condition, they were unable to afford them; moreover, they disliked the restriction on purchases of cigarettes, liquor and cleansing agents. Efforts to help this family, in addition to nutrition counseling, have included referral to homemaker service at the Department of Public Welfare, home visits by the Child Development Center nurse and assignment of the family as a special project to a nursing student.

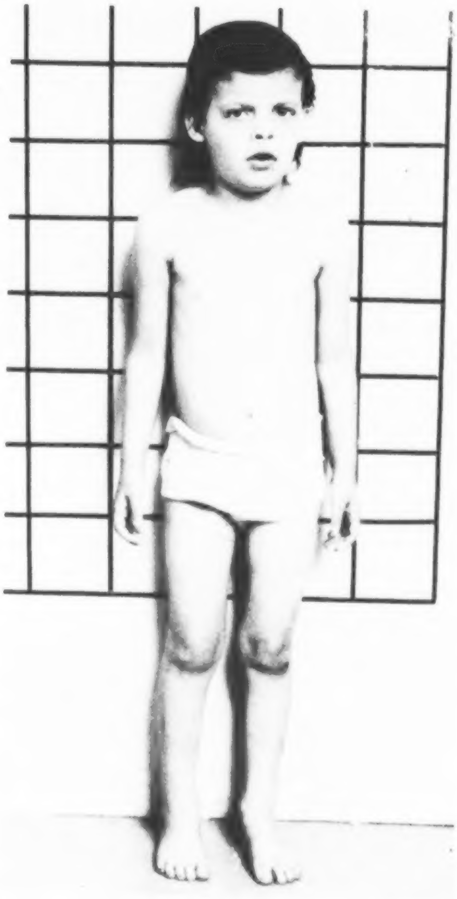


Figure 14

Food Habits

Population statistics indicated that 38% (Figure 19) of the patients evaluated had poor food habits, defined as multiple food dislikes, meal skimping or skipping, irregular meal patterns, absence of pleasant surroundings at mealtimes and force feeding and/or overstuffing.

J.H. (Figure 15) was a two-year and six-month-old mildly retarded Caucasian male with idiopathic infantile hypercalcemia and aortic stenosis syndrome. He had mechanical feeding difficulties with chewing and underdeveloped feeding skills. His total intake of nutrients, especially vitamin A, was four times NRC-RDA, due to his mother's force feeding him in addition to giving him a daily multiple vitamin with flouride.

Thirteen percent of the population (Figure 19) were coded as having bizarre food habits such as eating inedibles (paper, match heads or hand lotion) or eating salt by the handsful, butter by the stick, sugar by the bowl or raw meats--to name a few examples.

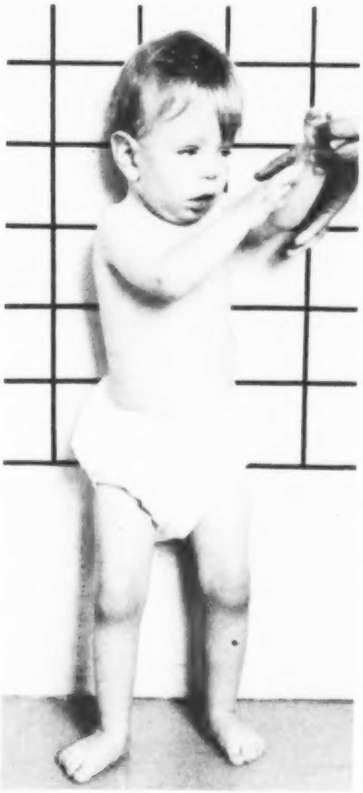


Figure 15

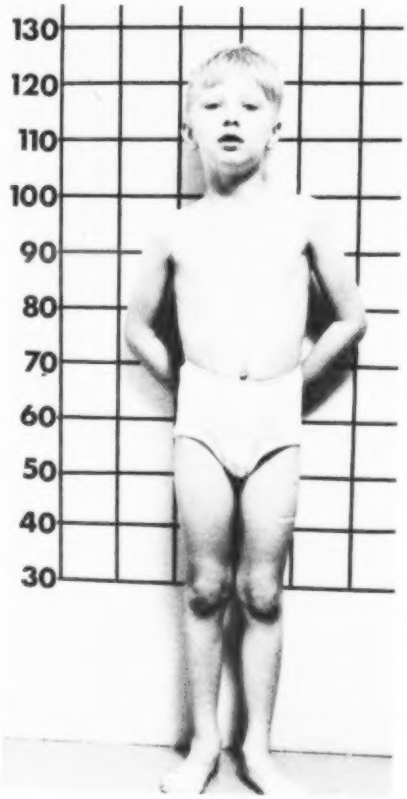


Figure 16

D.H. (Figure 16), an eight-year-old Caucasian male of average intelligence, is an example of bizarre food habits which perhaps were due to a childhood psychosis. He refused to drink or eat anything other than milk, milkshakes, hard candy, bananas, peanut butter sandwiches, ham and fried chicken. Moreover, he ate only one of these foods at a time--perhaps for several weeks duration.

Another interesting case example is D.B. (Figure 17), an eight-year-old severely retarded black male, who had undeveloped feeding skills and was hyperactive and destructive. For example, during the nutrition interview he attempted to strike the nutritionist in the back with a letter opener. He ate constantly all day, anything he could get his hands on, from soup to nuts, starch, salt or butter.

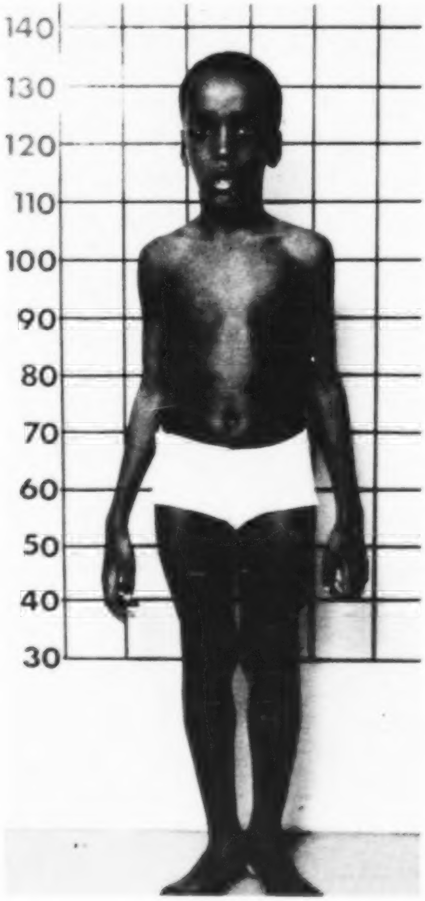


Figure 17

AGE AND FEEDING SKILLS*

Drinks unassisted	0.55
Grasps with thumb and finger	0.65
Masticates food	1.10
Holds and drinks from glass	1.40
Holds and eats with spoon	1.53
Discriminates edibles	1.65
Unwraps candy	1.85
Holds and eats with fork	2.35
Gets drink without help	2.43
Uses knife for spreading	6.03
Uses knife for cutting	8.05
Cares for self at table	9.03

*Vineland Social Maturity Scale

Figure 18

Feeding Skill Development

Another problem often seen at the Child Development Center was delay in feeding skill development. Twenty-four percent of the population (Figure 19) seen by nutrition had delayed feeding skill development.

In the developmentally handicapped child the acquisition of feeding skills, as well as other self-help skills, occurs at a slower rate than in "normal children." This delay is due in part to the child's decreased sensitivity to the environment since he explores less and does not learn as much as other children do spontaneously or through imitation. This does not mean, however, that the child will never learn, but rather feeding skills must be judged in accordance with the child's mental age rather than his chronological age. The ***Vineland Social Maturity Scale*** (Figure 18) defines the age at which a "normal" child should develop various feeding skills.

In some instances the child may need special devices for feeding. The tools to aid in feeding are numerous and have their advantages but should not be used after a child is capable of proceeding to a more independent or conventional stage of feeding.

Mechanical Feeding Difficulties

Of the patients who were evaluated by nutrition, 36% were diagnosed as having mechanical feeding difficulties (Figure 19). These difficulties such as chewing, sucking, swallowing and poorly or undeveloped feeding skills are not a disease entity, but are symptomatic disturbances which may result from brain damage and/or mismanagement of the feeding period. These problems, although not necessarily associated with mental retardation, frequently occur in children having mental retardation, physical defects and anomalies and/or emotional problems.

Nutrition Problems Commonly Encountered In CDC Patients Evaluated By Nutrition July 1968 - June 1969

	Total Population %	Retarded %	Non-Retarded %
Poor food habits	38	47	22
Bizarre food habits	13	11	19
Mechanical feeding difficulties	36	45	17
Delay in feeding skill development	24	36	0

Figure 19

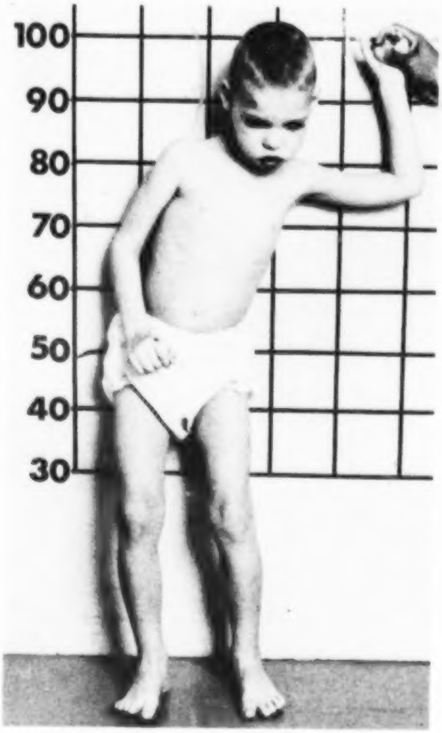


Figure 20

Often mechanical feeding difficulties result in conditions of dietary inadequacy as they hinder adequate food intake. When mechanical feeding difficulties are not correctly managed, other feeding problems may occur such as gagging, choking, vomiting and rejecting of food causing the nutritional status to decline thereby jeopardizing the total health of the child.

When a child is born with a defect in his sucking or swallowing mechanisms due to cleft palate or paralysis of the mouth or throat, special feeding devices such as tube or gastrotomy feedings, special nipples or Breck feeders may be used. Some children have all the physical necessities for eating and feeding but do not understand the concept. Incorrect management of the child and the feeding period can create or intensify mechanical feeding problems. Management begins with the assessment of the child's abilities and then the planning of a program for optimal development.

A case example of mechanical feeding difficulty is S.S. (Figure 20), a six-year-old profoundly retarded Caucasian male, who had cortical blindness and a convulsive disorder of mixed origin. He had no feeding skills and experienced a mechanical feeding difficulty with chewing which contributed significantly to malnutrition. His three-day food records were deficient in calcium, niacin, vitamin A, thiamine, riboflavin, calories and iron.

In older children missing or carious teeth and "Dilantin" mouth decrease biting and chewing efficiency. Such is the case of J.W. (Figure 21), a six-year-old profoundly retarded Caucasian female, who had no enamel on her teeth. She was overweight as a result of her soft, high fat and carbohydrate diet. In "Dilantin" mouth the overgrowth or soft gum tissue is easily scratched by crisp or hard textured foods. Chewing is then a very painful process, so much so that the children may refuse food which requires chewing as did J.W.

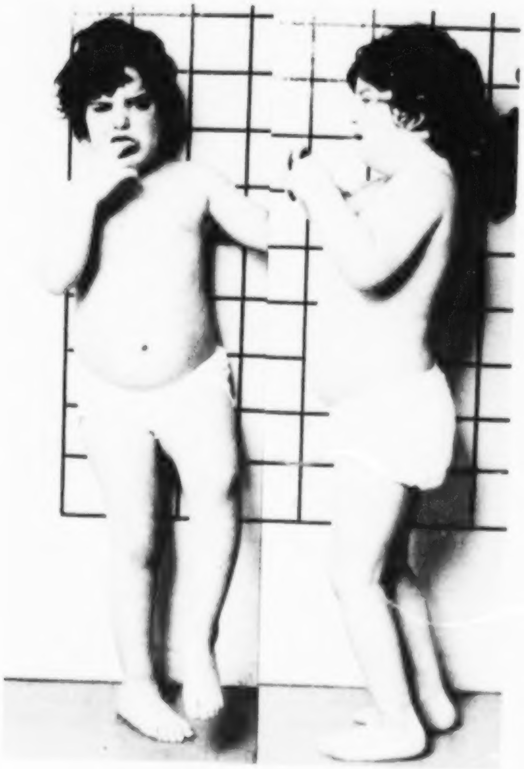


Figure 21

Metabolic Disorders

Of the 27 diet treatable metabolic disorders phenylketonuria was the most common one seen at the Child Development Center. Reportedly, one of every 100 patients confined to institutions for the mentally retarded has phenylketonuria as a cause of their retardation.

At the present time six children with phenylketonuria, ranging in age from fourteen years to six months, are receiving biochemical and dietary monitoring in the Child Development Center Clinic for Inborn Errors of Metabolism. Children attending this clinic reap the benefits of the cooperative efforts of an interdisciplinary team including the pediatrician, psychologist, nurse, social worker and nutritionist. Other vital members of this team are informed and cooperative parents.

T. A. B. (Figure 22) was referred to the Child Development Center at four weeks of age as a PKU suspect because of a positive Guthrie test. T. A. B. appeared normal at birth showing none of the "classic" signs of phenylketonuria. A diagnosis of PKU was verified by several biochemical tests: including serum phenylalanine above 20 milligrams percent, a positive urine ortho-hydroxyphenylacetic acid and urine phenylalanine above 40 micrograms percent.

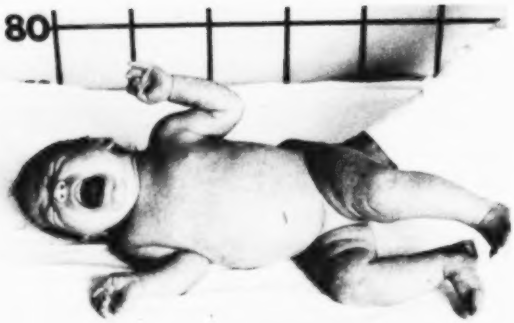


Figure 22

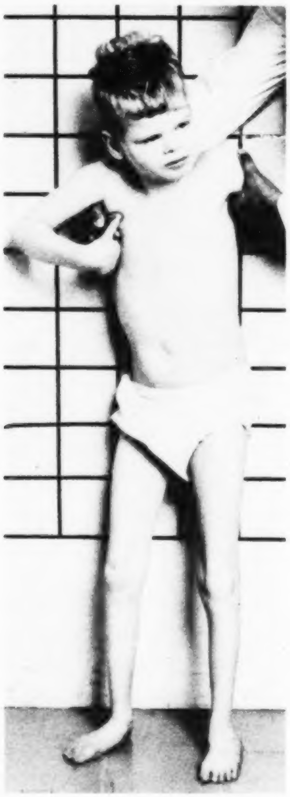


Figure 23

Then there was M.J. (Figure 23) who was three years of age and an untreated, undiagnosed case of phenylketonuria when he appeared at the Child Development Center for evaluation. Profound mental retardation, multiple feeding problems, strong and offensive urine odor, convulsions, eczema, absence of speech and irreversible neurologic damage--this was the price M.J. had paid for the delayed treatment of phenylketonuria. At best dietary treatment started at his age only in part could improve some of the unpleasant manifestations. The therapy, however, could never reverse the permanent brain damage M.J. had suffered.

T. A. B., on the other hand, was hopefully spared these ravages of phenylketonuria as she reaped the benefits of the cooperative efforts of an interdisciplinary team at the Child Development Center, an approach recommended by the American Academy of Pediatrics. T. A. B. had been seen at regular intervals by team members. The first week after diagnosis she was seen daily, then weekly until four months of age; and at six months she was seen once a month. After the initial evaluations were completed, the team members who actively participated in the study held a staff disposition conference to further discuss diagnosis and recommendations.

On each visit to the Child Development Center's Clinic for Inborn Errors of Metabolism the pediatrician and nutritionist obtain a brief history of T. A. B.'s recent progress (Figure 24). Together they review the food records kept by the mother three days prior to the clinic visit. Frequent topics of discussion are genetic consultation, subsequent dietary modifications and the continuing clinical, dietary and biochemical supervision.

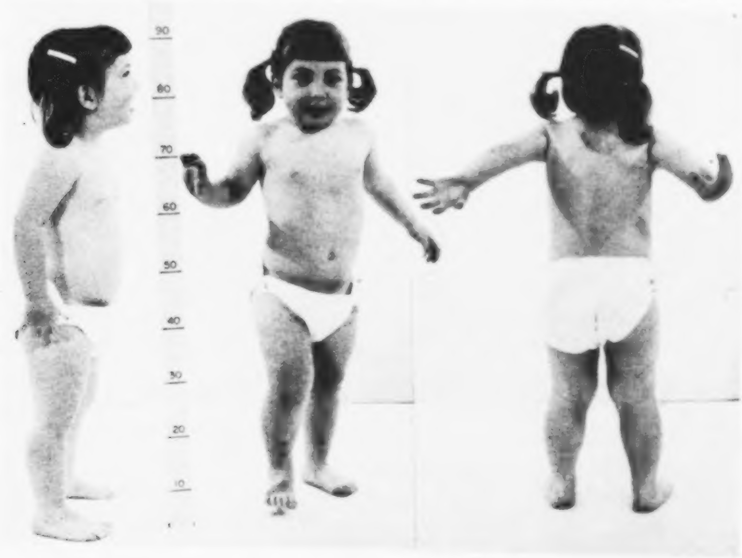


Figure 24
(T. A. B., age 2½ years)

Blood and urine specimens collected at home and in clinics serve as biochemical monitors of T.A.B.'s special diet. Urine specimens are collected on every clinic visit; in addition, the mother collects specimens between visits and mails them to the laboratory for analysis. The routine urine ferric chloride test formerly used for screening is ***not*** positive at ranges of phenylalanine of less that 12-15 milligrams percent. Therefore, it in itself is ***not*** reliable for detecting or monitoring PKU. However, urine ferric chloride tests are a good screening device to be used in conjunction with quantitative phenylalanine and ortho-hydroxyphenylacetic acid levels.

Blood specimens are obtained daily during the first week after diagnosis, weekly until the third month, and twice a week until 1 year. Thereafter, specimens are obtained monthly and more frequently during illness.

A micro-technique for quantitative serum phenylalanine determinations is now available. This relatively simple and accurate method of biochemical monitoring is performed with a minimum of blood loss and trauma.

During the clinic visit the pediatrician evaluates T.A.B.'s general physical condition and development. All organ systems are examined with particular attention given to the nervous system. Among the parameters for measuring growth are general head and chest circumferences, weight and height. The pediatrician carefully checks T. A. B.'s reflex functions, intergrated motor activities and adaptive and social behavior. If T. A. B. had been untreated PKU at this age, dire developmental delay would have occurred as well as mild to marked microcephaly, abnormal hand posturing with tremor, flapping or twisting mannerisms, hyperflexia, ankle clonus and frank spasticity.

While T. A. B. is being examined by the pediatrician, the nutritionist analyzes the food records kept by the mother. Of prime importance is the intake of phenylalanine, protein, calories and total fluids. T. A. B's diet primarily consists of Lofenalac* (Mead-Johnson) made from enzymatically hydrolyzed casein. This powdered food is purposefully deficient in phenylalanine and is designed specifically for use as the major source of nourishment for infants and children with PKU. However, Lofenalac* should never be the sole source of food for a phenylketonuric child for more than 24-48 hours and must be carefully supplemented with selected natural foods.

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* registered trademark

Feeding for T. A. B. is kept as much like that for a "normal" child as possible. Lofenalac* has been served as a paste or mixed with other foods as she has grown older. The natural foods made up the difference between the phenylalanine supplied by Lofenalac* and the amount needed to support her positive nitrogen balance and growth. Natural foods also provide some of the textures, colors and forms important to T. A. B. as she explored her environment and developed appropriate eating habits. Phenylalanine exchange lists were very helpful in planning and calculating T. A. B.'s low phenylalanine diet. The parents understood that Lofenalac* could not cure the basic defect.

The nutritionist continued to emphasize to T. A. B.'s mother that once a satisfactory diet had been established, dietary adjustments need to be made frequently, especially during the early weeks of life, and then every month or two, to assure an adequate but not excessive intake of phenylalanine. These dietary changes, are based on results of the blood and urine tests performed in PKU Clinic and by the mother at home.

The psychologist did an initial evaluation when T. A. B. was first brought to the Child Development Center and followed up with evaluations every six months which she continued during the first three years and annually thereafter. The Cattell Infant Intelligence Test, one of the few formal instruments available for this age child, was helpful in this evaluation .

The Denver Developmental Screening Test was administered at frequent intervals during T. A. B.'s infancy and continued to be used during the early years of her life. The screening was usually done by the nurse in the home as well as in clinic. When psychological testing is available, developmental screening is often done less frequently.

During the entire follow-up in clinic, the social worker maintained a supportive relationship with T. A. B.'s family. When the diagnosis of PKU was made, the social worker helped the parent come to grips with the reality of the diagnosis, working through any problems or resistance they may have had in regulating the diet. The social worker continued to reinforce the efforts of the other team members through regular contacts with the family.

When a low phenylalanine diet is instituted very early, as with T. A. B. and good control is established and maintained, the chance of preventing mental defiency in the PKU infant is very good. However, control of phenylketonuria depends upon diagnosis during the first few weeks of life, prompt institution of proper therapy and frequent monitoring of serum levels. Levels between five to ten milligrams percent are recommended.

As yet, PKU cannot be prevented. However, as demonstrated by this interdisciplinary team in cooperation with informed parents, carefully controlled diet and conscientious periodic follow-up can minimize the distressing effects of phenylketonuria.

Summary

Figure twenty-five summarizes some of the nutrition problems identified in the patients evaluated at CDC with respect to the two major socio-economic groups. The upper group is omitted as only four patients fell into that category. All of the patients represented in this data received nutrition evaluations; however, the data are based on dietary and clinical assessments without biochemical measures and caution must be used in drawing conclusions.

Nutrition Problems in Socio-Economic Groups

	Low	Middle
Underweight	19%	24%
Overweight-obese	9%	9%
Growth retarded	35%	23%
Malnutrition	41%	43%

Figure 25

Yet some interesting trends do seem apparent. No growth retardation was identified in the upper socio-economic group whereas 35% of the lower group and 23% of the middle group were coded as growth retarded. The percentage of overweight and obesity was identical (9%) for the two major socio-economic groups; however, the incidence of underweight was somewhat greater in the middle group (24%) than in the lower group (19%). Malnutrition was found in all socio-economic groups with the lower and middle groups having strikingly similar percentages, 41% and 43% respectively.

*** registered tradename**

The nutrition problems encountered in the white and black patients who received nutrition assessment are compared. The 45% of white children found to have inadequate intakes of specific nutrients and/or calories was very similar to the 42% of black children who had inadequate intakes. Growth retardation was more prevalent among the white than the black population (27% versus 17%). The difference was small in the percentages of black and white children who were overweight or obese (8.3 and 11%, respectively). Underweight however, was a somewhat more common problem in the black children (33%) than in the white children (23%).

Figure 1 compares some of the nutrition problems found in the retarded versus the non-retarded. As might be expected, poor food habits, mechanical feeding difficulties and delay in feeding skills were more frequent among the retarded than the non-retarded. However, bizarre food habits were somewhat more common in the non-retarded 19%, versus the retarded, 11%.

Although implication for this data is admittedly limited by absence of biochemical data as well as small representation from certain population groups, perhaps at least one conclusion is clear--nutrition problems do exist within every socio-economic group, within both the white and the black races and within all levels of intellectual functioning.

Kitty Roberts Coffey, M.S., R.D. *

CHILDHOOD OBESITY
OR
CHILDREN, MIND YOUR F's AND Q's

Illustrations by
John R. Jacobs

Introduction to Obesity

According to the American Medical Association (1), one out of five Americans weighs more than he should. Estimates of the proportion of adult obesity dating back to early childhood vary between 19 and 44 percent (2). At a time when malnutrition is being recognized as the greatest single health hazard confronting a large part of the world's population (the USA included), perhaps it is extraordinary and somewhat embarrassing to realize that obesity is fast becoming a primary threat to health in our country.

Definition of Obesity

Overweight or obesity is a condition of the body in which there is a relative excess of body fat. This definition implies that obesity and overweight are not the same. At the University of Tennessee Affiliated Child Development Center, 15 percent above the fixed standard of desirable weight is considered overweight; and a deviation of 20 percent above this standard is considered obesity. Although this application of body weight standards assures the recognition of most obese persons, it also permits the inclusion of a number of heavily built but not excessively adipose individuals. Therefore, measurement of adiposity is essential in unequivocal diagnosis of obesity.

Hazards of Obesity

Obesity is not only unattractive but is a serious hazard to health, increasing susceptibility to a number of disorders or hazards. Among these disorders are gallbladder disease, gout, diabetes mellitus, hypertension, possibly coronary artherosclerosis, pulmonary emphysema, chronic bronchitis, left-ventricular hypertrophy, dilatation, and failure, increased surgical risk and reduced life expectancy (2). Seemingly conclusive data indicate that with moderate obesity mortality increases by 42 percent and with marked obesity increases by 79 percent (3).

Obesity of Childhood

It is necessary to recognize that problems of childhood obesity differ in several important ways from those problems associated with adult obesity. Childhood obesity is more often constitutional or at least must by definition be acquired early in life; moreover, genetic factors seem to be etiologically involved more often than in obesity acquired in adulthood. For these and other reasons, there are certain problems of treatment which are also specific to children. Since the child is a developing organism it is paramount to consider carefully the effect of any form of treatment upon the child's growth.

The problem of childhood obesity is not new. Velat, et al. (4) measured 668 children in Cumberland, Maryland and in 1951, reported approximately 10 percent to be overweight or obese on at least one test. A few more girls than boys were found to be heavy. Eppright, et al. (5) used USDA weight for height classification based on Iowa data of Stuart and Meredith in a study of Iowa children. In 1956, these workers reported the proportion of overweight and obese girls increased from 15 to 45 percent from age nine to 16 years. Of these girls two to 15 percent would be considered obese. The proportion of overweight and obese boys was much less at all ages and showed less regular increases with age; at 13 years, 21 percent were overweight, seven percent were obese; at other ages, smaller proportions were either overweight or obese. Overweight, and even marked obesity, was a real problem in children 20 years ago, particularly with adolescent girls, and continues to be a problem today (6).

---

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Lack of Knowledge Concerning Obesity

Despite all the concern about the prevalence of obesity, both childhood and adult, and despite considerable research, relatively little is known about its causes and even less about its successful treatment. Obesity continues to be somewhat vaguely defined, and many misconceptions and part truths regarding its etiology and treatment are widely accepted by individuals in the health care professions as well as by the general public.

Etiology of Obesity

Great-GrandPa
etiology

At the outset, the cause of obesity appears simple, the patient eats more than his body requires for its operations. When the question is carried further, however, to inquire whether different bodies vary in their ability to deposit fat, and why the appetite for food in some children exceeds the body's actual demands, then the etiology of obesity becomes complicated and controversial.

The following is a classification of types of obesity in children according to mechanism as modified by Wright from Gordon and others (7):

Types of Obesity According to Mechanism

A. Regulatory Obesity
  1. Increased caloric intake
    a. Organic
    b. Functional
      (1) Neurotic overeating
      (2) Non-neurotic overeating
B. Metabolic Obesity
  1. Neurologic
    a. Lipodystrophy (rare)
    b. Adiposa dolorosa (rare)
  2. Hormonal
    a. Hyperadrenocorticism (rare)
    b. Adrenal carcinoma (rare)
    c. Hypothyroidism (rare)
  3. Enzymatic
    a. Genetic
    b. Obese-hyperglycemic syndrome

Regulatory Obesity

The modern nutritionist realizes that the easiest step in weight control is determination of the individual's tolerance for calories. The difficulties arise in understanding and contending with forces which impel the patient to exceed his tolerance. These factors are the common mechanism of obesity which are classified as regulatory.

Increased Caloric Intake

Organic

Examples of organic causes of increased caloric intake would be central nervous system injury or disease of the hypothalamus. The specific role of the hypothalamus in the origin of recognized forms of weight control is not yet known. Presently, the hypothalamus is better understood in experimental animals in which destruction of the ventro-medial area or satiety center can produce increased appetite and resulting obesity (8). By contrast, destruction of the lateral hypothalmic areas may lead to loss of appetite (9, 10). The complex interrelationship of the hypothalamus with other cerebral centers confuses assessment of the role of this central mechanism in the etiology of human obesities, therefore, hypothalmic obesity must be regarded as a rarity for the present.

Functional (psychologic)

Much more research is needed in the psychologic aspects of being obese, particulary childhood and adolescent obesity. To underestimate the psychologic effects of the pressures of society on the obese child, the obese girl in particular, is very dangerous.

Neurotic overeating

Monello and Mayer (11) compared 100 obese girls in a weight reduction camp with 65 non-obese girls from a typical summer camp. Three projective tests were administered in group situations: work association, sentence completion, and picture description tests. The results of these tests indicated obese girls showed personality characteristics strikingly similar to the traits of ethnic and racial minority group members; these latter traits, which include obessive concern, passivity, withdrawal, acceptance of dominant values, dependence and tension, have attributed by Gordon, Allport and others to the minority group members' status as victims of intense prejudice.

Stunkard and Mendelsen (12) observed obese subjects and found them to have personality characteristics similar to those just described; obessive concern and acceptance of dominant values. The subjects showed an unusual concern about weight, judging people in terms of weight, feeling hostility toward fat people and admiration toward thin people. Moreover, they felt their obesity was a handicap responsible for all their failures and disappointments. All subjects displaying such attitudes had been victims of childhood or adolescent obesity, whereas all subjects failing to display such attitudes had become obese as adults. The significant difference between these two groups is perhaps the extent to which punitive social pressures have influenced their personality development. Children and adolescents, being more sensitive to such pressures and less capable of coping with them, would be expected to respond more strongly than adults.

According to Bruch (13) and others, who over the past 20 years have studied childhood obesity and personality development, the obesity in some children is a temporary symptom which is outgrown as they succeed in mastering their anxieties. For others, however, it is a manifestation of a deeper and more permanent character disorder which demands psychiatric aid.

Hamburger (14) lists four categories of overeating which lead to emotional obesity: response to non-specific emotional tensions; substitute gratification in intolerable life situations; symptom of underlying emotional illness–especially depression or hysteria and addiction to food.

Non-neurotic overeating (culturally patterned)

Family eating habits are important in determining the eventual nature of a child's appetite. The young child learns easily and early to imitate his elders and to win their approval in the pleasant emotional environment with plentiful food which characterizes the mealtime of a family who enjoys eating intemperately. Experienced nutritionists and dietitians know how difficult it is to alter the eating habits of a single member much less a whole family. Too frequently the excessive food consumption is equated with pleasure, security, good health or the appreciation of the mother's culinary skill.

Decreased caloric output

At birth the basic metabolic requirement for a male child is about 50 Calories for each kilogram of body weight. In the late teens this decreases quite rapidly to about 40 Calories. During the remainder of the individual's life, the unit weight requirements decrease very steadily at about one percent annually throughout the remainder of the individual's life (15).

Organic

Examples of organic causes of decreased caloric output are convalescence or disease. Organic causes of decreased caloric output are relatively rare in the pediatric population.

Functional

Functional causes of decreased caloric output include awkwardness in sports, poor social adjustment and sedentary pursuits. Certainly a neglected side of energy balance is energy expenditure. It has been clearly demonstrated that certain obese individuals – for example obese high school girls (16) and obese women (17), are far less active than their respective non-obese counterparts. Johnson, et al. (16) showed that obese girls ate less, not more, than their normal weight controls but spent two-thirds less time in occupations involving any amount of exercise. Moreover, these researchers found that the onset of obesity occurred during the winter, again suggesting inactivity as an important factor in the development of obesity.

Stefanik, et al. (18) studied the food intake and amount and degree of participation in exercise of 14 obese adolescent boys and 14 paired non-obese controls at a summer camp. They found both a significantly smaller food intake and a smaller degree of active participation among the obese boys.

Bullen (19) studied the activity patterns of obese adolescent girls using a technique developed for time-motion studies in industry. The study involved the taking of a number of photographs of obese girls while exercising. These photographs were then used as a means for the estimation of caloric expenditure based on the particular pose represented. Bullen was able to demonstrate that the average obese adolescent girl expends far less energy during scheduled "exercise" periods than does her non-obese counterpart. The basic motivation and general attitudes of the two groups regarding activity were thought to be responsible for the difference. An inconsistency was the obese group's positive attitude toward exercise in questionnaires but negative attitude toward exercise in actuality.

Metabolic Obesity

Obesity due primarily to disturbance of metabolism occurs rarely. It is, therefore, obviously important that these uncommon types of obesity be appreciated for what they are, although they have little importance statistically in the general problem of weight control (20).

Neurologic

Lipodystrophy (rare).
Adiposa dolorosa (rare).

Hormonal

Hyperadrenocorticism (rare).
Adrenal Carcinoma (rare).
Hypothyroidism (rare).

Over the years tremendous quantities of thyroid extract have been used in efforts to treat obese persons in whom a deficiency of circulating thyroid hormones was never established. Children with overt clinical, laboratory confirmed hypothyroidism in fact do not tend to be strikingly obese, although they may have a somewhat pudgy appearance. Moreover, if some degree of obesity is on occasion associated with hypothyroidism in a particular child, it is never the sole manifestation of thyroid deficiency.

As both calorie restriction and increased physical activity would not be appropriate treatments for hypothyroidism, it is exceedingly important that a positive diagnosis be made. Only sodium-1-thyroxine or desiccated thyroid should be required.

Enzymatic

Genetic

In considering the family of a given obese child, it may be very difficult to separate the possible roles of heredity and familial and cultural patterns in the pathogenesis of the obese state. A number of studies (20, 21, 22, 23) have indicated that there is a very high incidence of obesity in one or both parents of obese children.

In a sample studied by Mayer (24) in the Boston area, about eight or nine per cent of the children of normal weight parents were obese. If one partner was obese, the proportion appeared to be approximately 40 per cent. If both parents were obese, the proportion rose to 80 per cent. Withers (25) found that children who had been adopted by obese parents did not show any increased tendency to become obese, even when such children had been adopted in very early life. Verschuer (26), in 1927, investigated identical twins reared in different environments and concluded that the principal factors determining body weight were of genetic origin. Evidence has been presented by Seltzer and Mayer (27) to indicate that obese adolescent girls tend to differ in somatotype from their non-obese peers. Since hereditary factors are the principal determinants of somatotype, the same may well apply to obesity. The obese adolescent girls, aside from being more endomorphic, appeared to be more mesomorphic and markedly less ectomorphic than their non-obese counterparts of comparable age.

The Lawrence-Moon-Biedl Syndrome is an example of an inherited disorder characterized by obesity. In some instances, this syndrome is accompanied by very marked mental retardation, polydactyly, hypogenitalism and pigmentosa. Although these children usually do not appear to have a particularly high caloric intake, their physical activity is often greatly reduced. Attempts to treat the obesity are almost always unsuccessful. Obviously, the obese state is only one aspect of a much greater problem.

Diagnosis of Obesity

Considerable research and expense have been put into finding a simple and relatively inexpensive but objective method for identifying the obese child. Perhaps the oldest indices for identifying the obese child have been the height-weight tables, ie. the Wetzel grid (28), the Faulkner (29), and others. As recently as 1966, Cheek, Mellits and Elliot (30) published linear regression equations making it possible to use height and weight for the estimation of both lean and non-lean body mass of a given child.

A more accurate diagnostic method than height-weight tables and one still applicable in the clinic situation is measurement of subcutaneous fat. The use of the triceps skinfold measure has been emphasized by the Public Health Service (31) and The Committee on Nutrition of the American Academy of Pediatrics (32). There has been some recent questioning, however, of the validity of applying the generally accepted Seltzer and Mayer (27) standards for obesity to skinfold measure, as variations in skinfold values have been demonstrated to vary with race, sex, geographic grouping and ethnic grouping (33, 34).

Other more direct measures of body fat, such as body electrolyte count, x-ray or body density, are cumbersome and costly, requiring considerable equipment, time and effort. These methods are difficult and often impractical to implement in clinic situations.

Forbes (35) measured the body concentration of K_{40} (the naturally occurring radio-active isotope of potassium) in obese children. He found that the subjects whom he studied comprised at least two populations with respect to the relation between fat and lean body mass. With increased height and bone age some children showed an increase in both adipose and lean tissues; in these youngsters, obesity had been present since infancy. Among other children the excessive weight was primarily attributed to an increase in body fat. In this latter group, height and bone age were normal; the onset of obesity had occurred in mid-childhood. It appears that the age of onset of "overweight" may be a primary concern in distinguishing the "oversized" from "overfat." Moreover, these data suggest that perhaps increased attention should be given to height and to bone age in the diagnosis of obesity in children.

Rauh and Schumsky (34) had three trained observers rate 1,130 Cincinnati school children using a visual observation scale of body roundness. These subjective ratings were compared with estimates of body composition derived from triceps skinfold measures and Wetzel grid values. It was concluded by these workers that it is feasible for trained observers to validly differentiate children by means of visual ratings. Perhaps this research supports the personal convictions of many pediatricians, nutritionists and dietitians who have had the benefit of experience in child clinics.

Treatment of Obesity

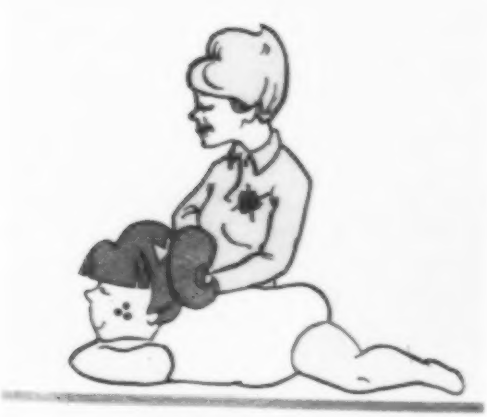
Saying that obesity is caused by eating too much is similar to saying alcoholism is caused by drinking too much. Neither statement elucidates treatment for the condition. Mayer (36) contends there is increasing evidence that obesity is actually a disorder of the body's food intake regulation and that it is a problem which requires the cooperative efforts of several disciplines; nutrition, physiology, psychology and biochemistry for solution.

To read the ads for a wide variety of special foods, pills, drinks, regimines, beauty spas and reducing salons and to hear conversation of dieters, one would think that conquering obesity is accomplished by simply walking into the nearest drug store or weight reducing parlor. Weight reduction plans which are presently popular in the medical or nutrition professions and/or in the lay population deserve close screening by those considering these treatment plans with regard to their possible application to childhood obesity.

Baths

An infinite variety of baths have been recommended: hot baths, cold baths, hot showers, cold showers, Turkish baths, Russian baths, steam baths and electric light cabinets. Through the production of profuse perspiration all of the hot baths can produce a transient weight loss. In fact a person may lose as much as two pounds in one hour as a result of water loss from tissues. Theoretically, however, a person would have to take 370 hot baths in each of which the body temperature was raised 3°F for one hour in order for that person to lose one pound of adipose tissue (37).

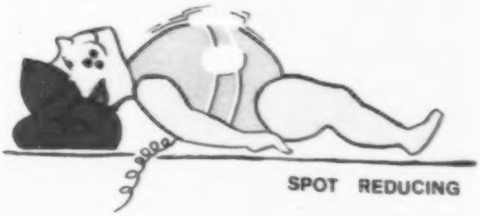
Massages



MASSAGES

Massage has been defined as the manipulation of the tissues of the living human body, either manually or by means of mechanical devices. No form of external manipulation is capable to removing adipose tissue from a particular region of the body. Massage will not reduce local deposits of fat, nor increase muscular strength, nor cause any significant change in the basal metabolic rate.

Spot Reducing



SPOT REDUCING

Countless false claims are made for procedures and devices supposedly effective in "spot reducing" of adipose tissue. Manufacturers of drugs, slimming creams, chin straps, massaging devices, reducing belts, rollers and electric vibrators and managers of beauty spas, reducing salons and physical culture clubs have made fantastic claims regarding the "priceless" value of their products or devices for "spot reducing."

Baths, massages, and spot reducing depend primarily on a special low calorie diet somewhat surreptitiously introduced along with the highly lauded physical procedure. Certainly these methods have no place in the treatment of childhood obesity.

Anorexigenic Drugs

ANOREXIGENIC DRUGS

Until a few years ago, discerning physicians were skeptical of anorexigenic drugs, with regard to both need and activity. Today, it is felt that anorexigenics, although never ***the*** treatment, may be useful as a part of a total program of treatment in some special cases of obesity. It is generally agreed, however, that anorexigenic drugs have little or no place in adolescent obesity control programs other than possibly to demonstrate to the patient in certain instances that weight loss is possible.

Surgery

SURGERY

Performance of surgical operations designed to "short circuit" the bowel or to remove adipose tissue can result in weight reduction. For success in the former a long segment of the small intestine must be side-tracked; diarrhea and other unpleasant symptoms of malabsorption often may accompany the consequent weight reduction. Death associated with hypocalcemia has been reported from short circuiting the small intestine (38).

Diet

Starvation Diets

STARVATION
DIET

The most drastic method of removing fat, other than surgery, is fasting. A number of investigators have reported starvation as a successful reducing technique. The duration of some of the fasts reported in the literature vary from two days to 117 days (39, 40, 41, 42).

The result of starvation dieting is said to be gratifying weight loss free of hunger. Some of those patients who eventually achieved normal weight appear to have established new eating habits and seem to eat substantially less calorically than before their fast. Others, however, return to their former eating patterns and, consequently, regain their lost weight.

Starvation does have its hazards. Hyperuricemia, decreased renal clearance of uric acid, symptoms of gout and orthostatic hypotension and anemia, as well as catabolism of undesirable amounts of lean tissue and negative nitrogen balance have developed in patients. Starvation, of course, is quite inappropriate in the treatment of childhood obesity.

Diet Foods

Today there are a number of diet foods on the market including: "diet" salad dressings, "diet" colas, "diet" canned fruits, "diet" breads and "diet" margarines. A recent example of research on these "diet" products is that of Monsen, et al. (43) who chemically analyzed three "diet" margarines available on the market and found them to have half the fat content and consequently half the calories of two standard margarines tested. As a second phase of the study, a taste panel evaluated the margarines. Less than half the panel members were able to differentiate between the diet and regular margarines. Those panel members who could discriminate had preference for the diet margarine on hot string beans only and for the regular margarine on toast and bread. Monsen and co-workers (43) indicated that, depending on the individual preference of the patient, diet margarines might be an effective, although costly, means of making a slight cut in calorie intake, as well as, affording a means of individualizing diets.

Peckos and co-workers (44) at Camp Seascape do not endorse the use of the dietetic foods. These researchers feel the use of dietetic foods is not natural and that it is more important to learn to use as many natural foods as possible because as a general rule dietetic foods are not universally available. Perhaps this is a particularly pertinent point with regard to the nutrition education of children.

Formulae Diets

The formulae diets consist of protein derived from milk and/or soya flour, fat from milk, corn and/or coconut oil, carbohydrate from lactose, sucrose, and/or starch and vitamins and minerals – the latter two being added in amounts which equal or exceed known requirements and the amount varying greatly with the individual product. These formulae preparations supply approximately 900 calories per day consisting of approximately 30 per cent protein, 20 per cent fat, and 50 per cent carbohydrate.

FORMULA DIET

One of the most important objectives in any long term weight control program with children or adults is that of educating the patient in good and bad dietary habits. This type of education is best achieved by building the therapeutic diet around ordinary foods. A formula diet is a preparation which in no way resembles the obese individual's ordinary diet. Consequently, the obese subject is unable to appreciate the difference in food composition between the formula and his ordinary diet. Furthermore, monotony of the formula diet may result in abandonment after a short period, at which point the patient usually resumes his normal food intake without the benefit of proper nutrition education.

Misuse of some of the formulae products have been indicated by those who assumed that they have a specific "pharmacological effect" and used them in addition to a regular diet. Both diarrhea and constipation have been reported by users of formulae diets.

Calorie Restricted Diets

CALORIE RESTRICTED DIET

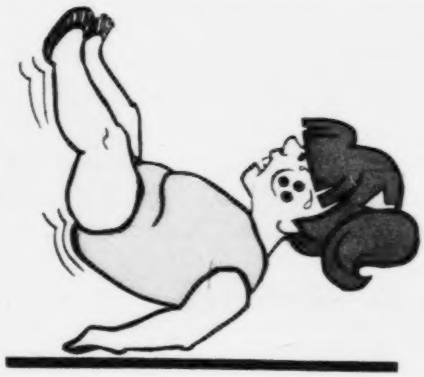
Work at Camp Seascape with adolescents has shown that the ideal way to lose weight is to cut portions of most foods, especially those that are high in starch and fat – cutting them to one-third or to even one-half (44). This is a weight reduction principle widely accepted by nutritionists and dietitians.

Huenemann, et al. (45) had 122 subjects keep four weekly diet diaries over a period of two years. Two of the diaries were kept during the eleventh and twelfth school years and two during the intervening and preceding summer vacations. The following observations were made on the obese teenagers: the "obese" boys and girls were the breakfast skippers; the "obese" boys reported more daytime snacks than other boys; the "obese" girls tended to eat fewer snacks and meals than the other girls and the "obese" boys and girls ate smaller amounts of dairy products, vegetables and fruits than did other subjects.

Some adolescents feel that the way to lose weight is to skip meals; especially popular is the skipping of breakfast. A study by Peckos, et al. (44) with college students at the University of Iowa found that breakfast skippers and skimpers showed: poor performance in the classroom and in athletics; dislike for school; a real work sag, particularly before noon; lack of endurance for jobs requiring strength and high caloric nibbling all day.

Parson (46) estimated that 60 per cent of all fat persons eat only one big meal a day, perhaps skipping breakfast, skimping on lunch and fasting between meals. He likened people with such eating habits to rats which were trained to eat within a two-hour period and consequently consumed more in that time than did their counterparts which nibbled throughout the day.

Exercise



EXERCISE

One reason often advanced for neglecting exercise as a factor in weight control is that "it consumes very little energy." This is obviously a fallacy. According to Mayer of Harvard School of Public Health (47), the energy expenditure of human beings can be tripled by exercising them vigorously enough.

The other fallacy advanced to justify neglecting exercise is that "if you exercise more, you eat more, and therefore the whole process is self defeating." This is not true at low levels of energy expenditure. For example, if rats exercise more than an hour, their food intake increases over and beyond their usual intake corresponding to one hour; and under these conditions, the body weight remains constant. If the length of exercise is further increased, appetite increases until the animal is exhausted and starts eating less. More relevant to the problem of obesity is what happens at very low levels of energy expenditure. If exercise keeps on being decreased, a point is reached when the food intake no longer decreases. As a matter of fact, it significantly increases again, because of decreased utilization of glucose under these conditions. This is also true in man (47).

Summary

mind your
~~p~~'s and q's
F

When faced with the problem of reducing an obese child or adolescent's weight at the University of Tennessee Affiliated Child Development Center the objectives are:

1. To establish a good relationship with the patient.
2. To make a thorough inquiry into the patient's kind, degree and rate of physical activity, and into his present and past dietary pattern.
3. To determine underlying causes of obesity, if possible.
4. To prescribe a diet with consideration of his:
    a. Nutritional needs
    b. Present dietary pattern
    c. Developmental age
    d. Growth needs
    e. Type of body build
    f. Present and proposed extent of activity
    g. Degree of impatience for results.
5. To re-educate the patient in eating habits.
6. To motivate the patient.

In 1967, Peckos and co-workers (44) reported that they have never had a girl in their eight years at Camp Seascape who failed to lose weight while ***at camp***; this indicated to these researchers, that under specialized conditions, weight could be controlled. However, children, as well as adults, live under a variety of conditions, many of which are not conducive to weight control. The motto at Camp Seascape, and an appropriate one for overweight children, is: "Mind Your F's and Q's" (frequency and quantity) "and you'll lose weight!"

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M. Elizabeth Brannon, M.S., R.D. *

THE DILEMMA OF FOOD HABITS

"Meal times can be happy times if we remember to look at food from a child's point of view." Dr. Miriam E. Lowenberg in the film, "Food as Children See It."

Children's eating behavior is a perplexing problem to many parents as evidenced by the frequency with which parents seek advice about food from pediatricians, nutritionists, public health nurses and other professionals. Perhaps health workers need to capitalize on this concern, using it to inspire parents to feed children "protective foods" and to discourage parents from feeding "junk."

Eating habits should be of primary concern during the growing years, first, because nutritional needs are crucial for reaching growth and development potential, and second, because food habits are being formed which can help or hinder health throughout life. But few parents think about food habits until problems arise, and problems are usually more difficult to solve than to prevent. Parents need help in guiding their children toward healthy attitudes with respect to food and eating.

Good food habits may be defined as willingness to eat foods that science has shown provide the best nutrition. Food habits require careful cultivation throughout the growing years.

Bases of Food Habits

Children are born without food prejudices. They gradually learn to like what is eaten in their culture. Thus, American children develop a preference for meat and potatoes, Asian children for fish and rice, and Mexican children for beans and tortillas.

Families develop their individual habits within the framework of their culture. Families differ in their attitudes toward food from those who are completely engrossed with food to those who are relatively unconcerned. These attitudes are conveyed unconsciously to children by their families.

Food attitudes are transmitted primarily by example. Food aversions of children are associated with those of their family members. Children tend to like foods which are familiar and foods with which they have pleasant associations. Children learn about food not only by what is fed but also by how it is fed. Children's food habits begin to be formed with their earliest contacts with food and with the person who feeds them. If food is given when the baby is hungry, if he is held securely and looks into a pleasant face and hears pleasant voices during feeding, his idea about the world will be different from the baby who, after a long period of exhaustive crying, is finally fed by a complaining feeder.

Children may like a food not only because of the pleasure of satisfying hunger but also because of emotional ties with those who fed the food. Positive feelings of love and encouragement and negative feelings of impatience, irritation or anxiety can be conveyed through the feeding situation.

Meaning of Food

Food is a basic human need as are shelter and clothing. But food is sometimes used in other ways, and children get a distorted idea of the meaning of food. Food is sometimes used in rewarding or punishing behavior. Sometimes foods are inappropriately classified as "good for" children or "bad for" children, yet the consumption of these foods by other family members is contradictory. Is it any wonder that children become confused about food? Food is for life and health, not for discipline.

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Mealtime Management

Often parents need to discipline themselves to maintain a calm attitude regarding their children's eating. When a problem arises, parents should ask themselves whether the problem is a reflection of faulty family food practices or is a result of inconsistent management of the feeding situation.

The objective at mealtime is to bring children and nutritious food together happily. A variety of foods chosen from the Basic Four Food Groups should be offered at mealtime in a matter-of-fact manner. The child is the final judge of what is eaten. If the child refuses to eat, the food is removed without comment after a reasonable length of time, about 20 minutes, and no food is allowed until the next meal. A quiet, relaxed, pleasant atmosphere is maintained throughout. Wise parents guide quietly rather than resort to begging, bribing, forcing, nagging and threatening. Mealtime should not be allowed to become a battleground for testing powers. Children enjoy being the center of attention, and if they learn that refusing to eat can displease parents, create a crisis or gain attention, they have learned to manipulate mother and thus rebel against authority! Parents should give attention at times other than mealtime. Negative ways of dealing with children who refuse to eat well may have negative psychological effects. A mother's anxiety, for example, may be perceived as a negative attitude toward the child who may then reject the feeding relationship.

The physical environment is important for eating success. Children should be positioned comfortably to reach what they need. The utensils which are used should be appropriate in size and design.

Including the child at the family table too early may create problems such as attention-seeking behavior and dawdling. Feeding the child part of the meal alone may be a satisfactory solution for both the child and other family members. Since the family sets the example for the child, members must be aware to avoid conflict during a meal and to reserve discussion of their dislikes or criticism of food until later in privacy.

Appetite

One of the most frequently expressed concerns of mothers is that their children are not eating enough. Often this is a parent-invented problem and the children are not really nutritionally deprived. What many parents do not understand is that appetite is related to rate of growth. The infant's growth is rapid and his appetite is ravenous. After his first birthday when growth occurs at a slower pace, the appetite shrinks. The increased activity imposed by school has a stimulating effect on the appetite, and the accelerated growth rate of adolescence again brings a ravenous appetite.

Appetite is usually a safe guide as to ***how much*** food a child needs. (Note: Appetite is not a safe guide to the ***right kinds*** of foods for good nutrition.) A child should therefore be the one to decide how much to eat and should not be forced to eat more than he wants or needs, since this may lead to more serious problems. Often what parents call a poor appetite is really a good, small appetite. When this is the case, it should be emphasized not to force more food but to be careful to offer only valuable protective foods. During these years when nutritional needs are great but the child's capacity is small, parents must choose carefully the foods that will satisfy that small appetite. Caution should be exercised so that the appetite is not wasted on "empty calories" that provide no nutrients. Sometimes a worried parent will give too many sweets just to see the child eat something. (Note: There are a few children who rarely feel hunger, and when they do, it is intense and fleeting. Such children require small, frequent meals.)

Parents should be prepared for food jags----eating only one food for a time. These will pass with patient understanding on the parent's part. The quantity a child eats will vary widely from time to time, but usually is no cause for worry.

Eating behavior is influenced not only by appetite but also by motor development, sensory learning, the growing struggle for independence and involvement with socialization. Parents must not impose rigid rules but adjust to nature's plan, learning to anticipate stages of development and guide their children toward independence.

A quiet period for relaxation before mealtime helps appetites. Mealtime should be a happy time. When possible, children should be allowed to serve themselves. Parents should not worry about the table manners of the very young but should set a good example for them. Mealtime conversation should be kept happy and cheerful, and children should not be singled out for criticism. Children can thus gain a competent feeling about themselves at mealtime which will give them confidence in other situations.

Foods for Children

Human beings are not born knowing what foods are good for them, and they need their parent's help to learn. Although appetite is a good judge of how much to eat to supply energy, it is not a good judge of what to eat to provide good nutrition.

Every day foods should be served from the Basic Four Food Groups: milk group, 2-4 cups; meat group, 2 servings; vegetable-fruit group, 4 servings; and bread-cereal group, 4 servings. When the daily food guide is followed, the protective foods are supplied in recommended amounts with the possible exception of iron. The size of servings will naturally vary with the age of the child, but for the preschooler, an adequate serving of meat or vegetables is one tablespoon for each year of age.

Young children have sensitive taste buds and usually prefer lightly seasoned foods, simply prepared. Iodized salt is still necessary and mothers should be reminded of this. Appearance and smell are important to children and can add to their enjoyment of a meal. Many children prefer vegetables raw, and dentists encourage serving raw vegetables and fruits frequently to promote dental health. In preparing foods for children, care should be taken to remove parts that are hard to chew. When young children are learning to feed themselves, finger foods should be served often, and foods to be eaten with spoon or fork should be served in small pieces that are easy to pick up. One of the most important keynotes in feeding children is variety. Children need to become acquainted with as many different foods as possible.

Breakfast deserves a special word. Some of the most valuable foods are served at breakfast. If this meal is skipped, it is likely that eggs, milk, fruit and cereal will be missing from the day's food intake. Breakfast skimping or skipping is a bad habit. A good breakfast is more important that the extra fifteen minutes of sleep that often replaces it. Again, family example is the key. The family that sits down for breakfast together is likely to have good breakfast habits.

Unfamiliar Foods

Children are interested in the world about them. This interest should be used to expand the child's familiarity with a wide variety of foods. New foods should be introduced one at a time along with familiar foods. Only a taste of the new food is given and other family members should seem pleased about the food. The child should never be asked if he likes it, for this may give him the idea that he is not expected to like it. Just as it takes time to make friends with a new person, so it takes takes time to become familiar with new food. Seeing, touching and smelling may be as far as the child goes on first introduction to an unfamiliar food. The new food should be offered several times to give the child an opportunity to learn to like it. If the child refuses the food after several exposures, the mother should wait a while before offering it again. Remember, the child should not be forced, but encouraged to taste everything. He should not be scolded if he spits out a new food, but it should be offered again later. Parents need to recognize that each child is different with his own personal likes and dislikes. A child's dislikes should not be discussed in his presence because this may convince him that he is not expected ever to learn to like these foods.

Food Dislikes

Food dislikes of children are greatly influenced by dislikes of family members, especially siblings. Foods that are disliked are often those that are unknown or unfamiliar or have unpleasant associations. This further points up the need to acquaint children with many different foods and to avoid emotional experiences at mealtime. When a person is anxious, his food acceptance is decreased. During illness, children often exhibit a temporary regression in food habits and accept only favorite familiar foods.

When a child dislikes a basic food such as milk, parents should see that the nutrients in that food are supplied in some well-liked substitute. Rather than make a "to do" over the child's not drinking milk or "doctoring" milk, thereby developing the thought that milk must be doctored to be good, why not use different cheeses, puddings, custards and ice cream to furnish the missing nutrients? Non-fat dry milk powder with vitamins A and D added can be used to enrich anything from a hamburger patty or mashed potatoes to cooked cereal or canned soup, and the child gets his milk without recognizing it. Milk should still be given as a beverage, but no issue should be made if it is not drunk. Tea and coffee are not suitable substitutes for milk.

Parents should avoid using protective foods as a medium for administering medicine. Unpleasant associations can be formed which cause rejection of the food. When medicine must be given mixed with a liquid, carbonated beverages or artificially flavored drinks would be more appropriate than milk or fruit juice.

Sweets

The place for sweets is at the end of a meal. Dessert should be an ordinary part of the meal and should not be dangled in front of the child as a reward. If the value of sweets is over-emphasized, children get the idea that they are more valuable than other foods.

Desserts should be kept simple for children. Ice cream, puddings, custards, fruit or simple baked goods made with enriched flour are appropriate for children. Many purchased bakery items and prepared mixes are not made with enriched flour, so the mother needs to check labels carefully when she shops.

Sugar should be used sparingly on cereals and fruits. Canned fruits are best if packed in their own juices or in light syrup. Oversweetening dulls the appetite and taste for essential foods.

Parents who are concerned with children consuming excessive sweets should consider the availability of sweets in the home. The adage "out of sight, out of mind" applies. The solution often lies in removing the temptation and replacing the candy box or the cookie jar with a fruit bowl. This may mean parents will have to alter their consumption of sweets, too. Grandparents, neighbors, stores and popsicle trucks may challenge the parent's good intentions.

Snacks

There is nothing sacred about three meals a day, and perhaps five or six meals would be more natural for the preschool child. This does not mean that the mother must be a short-order cook. It means that a supply of nourishing foods are on hand so that snacks can be mini-meals made up of protective foods. Snacks should be spaced and planned so that they do not interfere with regular meals. If they do interfere with appetite for meals, snacks might be limited to fruit only. The main consideration with snacks is not to allow "extras" to replace protective foods.

Overweight

A word of caution should be given regarding overweight. This problem may develop quite early, influenced by overdoing "demand" feeding and by the prevailing attitude that the fat baby is cute. Or it may begin with the mother who, fearing her child is eating too little, overestimates what the child needs and encourages overeating. If fed too much, a child may establish the habit of overeating that will be a hindrance for life. If a child is praised too much for eating well, this positive reinforcement may lead to overeating to be a "good" child.

Summary

Food habits are learned through repetition at least three times a day. Parents play a key role by providing the foods and setting the example for their children. The objective is to help children learn to accept and enjoy a large variety of foods they will eat for a lifetime.

Parents who provide appropriate foods, serve them pleasantly, encourage interest in food and let the children be the judge of what they eat have a minimum of problems where their children's eating behavior is concerned. When groceries are selected so that all choices possible to the children will be good choices, parents can relax and assume a permissive attitude about food. The essential is ***planning*** for good nutrition, for neither unlimited buying power nor superior intelligence guarantees a good diet. Good food habits are developed only with patience and persistence over a long period of time. It is worth the effort. After all, good nutrition is an investment in children's future health and happiness.

Kitty R. Coffey, M.S., R.D. *

FEEDING LITTLE FOLKS—AS THEY SEE IT **

Feeding little folks can be fun if we know three things: (1) what to expect from children, (2) what foods to serve children, and (3) how to bring food and children together happily. Let us look first at what to expect from children.

All children are different. For example, children have different body builds; of course, body build is dependent upon inheritance. Lack of proper food can prevent a child's reaching his full stature, but stuffing him with food will not change him from one height to another. In other words, nurture helps nature reach its potential.

Children grow at different rates. Children go through periods when growth is rapid and then slows down. When growth does slow down, the appetite decreases. For example, the appetite of the two to six year old may fluctuate significantly as the growth is slowing up.

Children have different degrees of both gross and fine motor coordination. Getting food on a spoon and carrying it to the mouth is not always a simple task, but may be a complex business for the normal child and an even more complex problem for the child who is handicapped--physically or perceptually.

Children react differently to the same situation. There are as many personalities as there are children. However, we can say there are a few "usuallys." Usually a child can decide for himself how much food he needs. Usually the larger child eats more than the smaller child. Usually the less anxious child eats more than the nervous child. And usually the more active child eats more than the less active child.

All children go through similar stages of development. For example, they go through periods of being very, very active. It may be necessary to allow a child to stand while he eats for a period of time because he is so active. Eventually, however, he will sit down because he sees us sit down to eat.

Children may be stubborn. When a child closes his mouth against food he is telling us something--that he does not want any more. If we accept his verdict as matter of fact, he will not get the idea that he can make life exciting by declining to eat.

Children are the world's greatest imitators. Imitation, of course, is one of the most powerful forces in learning. Too much praise for spinach may convey your anxiety about his eating that spinach.

Children also have a need for a routine. Regularity in mealtimes can be helpful to a child's emotional and physical well-being. However, regularity should not be overemphasized. Some children at certain periods have difficulty in following a rigid pattern.

Some children eat more slowly than others. Urging speed in eating beyond a certain point will only spoil a child's pleasure in eating. If the child is restless, let him get up and move about. Allow ample time for eating; then after about 30 minutes, firmly, but quietly, remove the plate.

Occasionally children may go on food jags. A child may want a hamburger and French fries every day for lunch, then suddenly refuse either. If we can be patient and casual, the child will usually switch from this jag in a short period of time. We can help a child become a less demanding, more reasonable person by being somewhat reasonable in how we deal with this kind of problem.

Children have need for the security inherent in rules. A child needs a few simple rules agreed upon by the parents. Too many rules, however, will confuse him. If we grown-ups must insist upon a clean plate before dessert, we can compromise by serving the child small portions.

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** Presented at Nutrition Workshop, Child Development Center, January, 1971

Speaking of desserts, a recent cartoon depicts a dozen cub scouts seated in the mess hall with their scout master. The caption reads: "Asking why we've gotta eat vegetables before we get dessert is no challenge of authority; we're just asking for a review of priority." Why not a review of priority? Why could not dessert be so nutritious that it could be an integral part of the meal, just as would be the meat, or the vegetables or the milk? Consequently, the dessert could really be eaten at any time during the meal. Hence the dessert would not be glorified or made more special by dangling it as a delectable prize for eating all that less desirable food. Moreover, when a sweet dessert is eaten last in a meal and not followed by a cleansing food or by brushing, tooth decay is promoted! Of course, if the dessert is a particularly sweet one, it may cut down the appetite preventing the eating of other more "nutritious" food. Perhaps the answer is to serve the many nutritious desserts such as puddings (tapioca, cornstarch, rice, bread), smooth custards and other desserts with lots of eggs and milk in them, as well as enriched cereal products and, of course, fruits.

Self-help skills are very important with children. A child should learn to do for himself everything which he can. The time to teach a child to do something is when he is ready. If you let that time pass, it may be too late later. It is therefore very important to give children opportunities to be helpful. To a child washing dishes, the lovely sudsy water can be a delightful joy. The results may not be perfect; but if we praise a reasonable effort, we build the child's faith and confidence in himself. Children can perform a number of tasks. For example, they can set the table, make salads, pour milk, make sandwiches and help with cleanup. Moreover, children can brush their own teeth after each meal or snack.

What foods should we serve children? As a simple, good guide refer to the Basic Four Food Groups--milk, meat, fruits and vegetables, and breads and cereals.

From the milk and milk products group, three or more cups of milk daily are recommended for school children with smaller servings for some children under 8 years. The milk group supplies children with protein, calcium, phosphorus, riboflavin and other vitamins. I firmly believe we should not push milk at children and demand that they drink it. When I was in the first grade I stayed in every recess because I did not drink all of my milk. That was before we had homogenized milk, and I just could not take the cream that was left after drinking the milk from under the cream through a straw. I shall never forget that! We certainly should not make meal time an unhappy time by forcing a child to drink milk or eat any other food for that matter.

Remember that milk is not the only food from the milk group. What about the other dairy foods--cheese and ice cream? Serve your preschool child plain ice cream without nuts or other rich flavorings. One-half teaspoon of cottage cheese or grated American cheese on a cracker is a good way of introducing cheese as a snack into the child's diet. Try cheese sauce on rice, fish, vegetables and spaghetti. Children love toasted cheese sandwiches.

How shall we serve milk? Of course, we should be very aware of the necessity of protecting the flavor of milk. Children up to four years of age have more taste buds than we do as adults; in fact, they even have taste buds in their cheeks. We can serve children cereal cooked in milk instead of water. We can also serve cream soups. According to cartoon series, ***Family Circus***, cream soup is the "tenderest food in the world."

A second food group is the meat, egg, poultry and fish group which furnishes protein, iron, phosphorus and B-complex vitamins. How much meat should we serve children? One or more child-size servings daily of meats, poultry or fish is recommended for growing children. (A child-size serving is defined as being one half to one ounce.) An egg a day is also highly desirable. The size of serving should be bite-size so that the child can eat it even with his fingers if he needs to. It is helpful to remember that children prefer their meat moist in texture and mild in flavor. With regard to eggs, remember that the home economics student had the wrong idea when she commented, "I have been boiling these eggs for twenty minutes, they ought to be good and soft by now."

A third food group is the vegetable and fruit group. Leafy green vegetables give us good sources of calcium, iron, vitamin A and ascorbic acid. Some good vitamin C sources are grapefruits, oranges, tomatoes, tomato juice, raw cabbage, green pepper, raw turnips, potatoes in their skins, strawberries and melons. Among the good sources of vitamin A are green leafy vegetables, sweet potatoes, carrots, apricots and cantaloups.

What is a child-size serving of fruits and vegetables? You probably remember the old familiar rule, one level tablespoon per year up to 4 years of age. Generally speaking, a child should eat four to five child-size servings daily of fruits and vegetables. One serving should be a good source of vitamin C, one or two should be green or yellow vegetables, and one a starchy food. However, if the child is going through a stage of preferring fruits to vegetables, let him have his four or five servings from the fruit group; this is better than setting the stage for future resistance to vegetables.

Dennis the Menace recently had this to say, "The thing I don't like about stew is letting the good meat get mixed up with all those vegetables." Try to serve vegetables in a form that children will like to eat them. Children prefer fruits and vegetables that are young and tender and mild in flavor. Raw vegetables as finger foods may often be eaten when the cooked vegetable will not, so take advantage of this.

To summarize principles of cooking vegetables, remember that nutrient retention increases as cooking temperature, cooking time, amount of cooking water and food surface area are decreased. In other words, the whole potato baked in its skin retains more nutritive value than do diced potatoes cooked in a large amount of water.

The fourth food group is the bread and cereal group which provides protein, minerals and B-complex vitamins. This is a food group especially loved by children. We need to choose carefully from this group the foods which will be of most benefit to the child. In order to get the highest food value, serve the preschool child one child-size serving of whole grain cereal or enriched or fortified cereals. At each meal you may offer a piece of bread (child-sized) and butter. The following have about the same food value: One-half cup oatmeal, one piece whole wheat toast and one cup whole grain or enriched ready-to-eat cereal. As dry cereals absorb a large quantity of milk they provide a good means of getting more milk into the child's diet. Cooked cereal should be served warm not hot. You may sprinkle brown sugar instead of white sugar on the cereal and add raisins or dates or fresh fruit to make it more attractive.

Children may prefer toast to bread, and they always prefer quarter or half slices to whole slices. Open faced sandwiches also have special appeal. Of course, breads made with milk and eggs have more food value. For children under six, day old bread is better because it is easier to handle. Macaroni, spaghetti, noodles and white rice, unless enriched, have less food value than the aforementioned products. However, they can be effectively combined with meat, cheese, eggs, milk, fruit or vegetables.

We have reviewed what to expect in children and what foods to serve children. How do we then bring children and food together happily? At the outset, the child should have that "clean, rested, hungry feeling." The child who is tired and/or excited can not enjoy his food; give him an opportunity to rest before meals.

The food should be attractive in appearance, taste, texture and smell. Children prefer small servings. You need to adjust your point of view with the child's and see food as children see it. A heaped up plate is discouraging to a child--maybe so discouraging that he will not even taste. He likes each food to stand out separately. It is better to put a teaspoon of food on a child's plate and have him ask for more than to put a tablespoon on and have him leave it. Teaspoon servings can grow to tablespoons.

Give the child some freedom to choose his own food. Before you coax or urge him to eat, think how you feel when food is forced on you. When a new food is introduced, serve old favorites along with it. If he refuses to taste, do not let him know it matters; he may taste another day.

Children should have some freedom to eat in their own way. Let them feed themselves with their fingers; many foods were intended to be eaten that way. Do not expect table manners until after the child learns to eat a variety of foods, is able to handle food and eating utensils skillfully and feels comfortable as part of the mealtime group.

A good physical environment should be provided for mealtime. The eating area should be bright, well-ventilated, and clean with suitably sized tables and chairs so that the child's feet will rest on the floor. Plates, cups and silverware should be easy for the child to handle.

Probably most important in bringing children and food together happily is a good emotional environment or a lot of vitamin L (LOVE). The earlier children learn to enjoy eating, the better the chance that good eating habits and attitudes will be formed. Food habits and attitudes formed in early years may remain throughout life. In order to make mealtime more pleasant, provide soft music at times, accept occasional table accidents as part of growing up, and do not withhold food as punishment. In other words, bring food and children together so happily that the children leave a meal with the same comment as Dennis the Menace, "My, we should do this more often!"

Harriet Cloud, M.S., R.D. *

CONTINUUM OF NUTRITION SERVICES FOR THE MENTALLY RETARDED AND DEVELOPMENTALLY HANDICAPPED CHILD FOLLOWING EVALUATION**

THE PROBLEM

Continuum of nutrition services is of importance in all therapeutic dietary areas if lasting benefit to the patient is anticipated. It is of possibly greater importance in dealing with retarded and developmentally handicapped children.

Why is this continuum of follow-up so important to this particular group? All who have worked with the retarded could answer this question easily. Barnard (1) has described this problem in her paper, "How Families React to the Crisis of Mental Retardation." Barnard writes: "The important aspect of dealing with the problems of mental retardation relates to the family. The parents experience certain emotional states as a reaction to having a deviant child. There, therefore, seems to be a fairly predictable pattern which the parent goes through in handling the problems the deviant child presents. It seems logical to assume that having a retarded child presents a threat to the parent's marital integration and the family's continuity and that the threat might best be handled with development of a strategy or place for the family to decide on its goals and ways of attaining such " (1).

Barnard (1) goes on to suggest that in certain stages of the family's plan for coping with the problems of accepting the retarded child the parent is not ready or able to listen and therapy should be witheld.

My conclusion in regard to Barnard's (1) observations is that a properly timed contimuum of nutrition service is particularly important in finally finding the moment when all of the nutrition education necessary will become meaningful to the patient and his family.

Providing follow-up services is of concern to all of us involved with nutrition services as well as all the disciplines involved in patient care both because of the impact it has on the patient and his family as well as the professional personnel involved.

What are the factors involved which result in good or bad follow-up?

(a) coordination of services
(b) communication to the referee and feedback
(c) time
(d) community resources (Food Stamps and Commodity Resources)
    1. existence
    2. services provided
(e) personnel
(f) cost
(g) knowledge of dealing with retardates and their families

In considering these factors, let me describe the evaluation or diagnostic experience a child and his family encounter.

A normal day will involve first the intake or social interview; next the pediatric evaluation with generally a large number of laboratory tests and x-rays ordered; next the nutrition evaluation which is generally scheduled around the noon time meal hour for observational purposes. Occupational therapy may evaluate the child next followed by psychology, speech and hearing, nursing and special education.

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**Presented at Nutrition Workshop, Child Development Center, June, 1969

If a genetic problem is suspected, another evaluation is made by the geneticist. Let me hasten to remark here that all of these evaluations are not held in the first day. The evaluation may require 2-4 days and sometimes hospitalization.

Following the evaluations, each team member summarizes his findings for the patient's chart and the case is then presented for "staffing." This is the conference where recommendations are considered and a plan for follow-up discussed. It is quite possible that some recommendations will include return visits to The Center for speech therapy, occupational therapy, psychology, nutrition and medicine. Consideration for the type of follow-up is based on where the patient lives, the availability of services in that area, the availability of knowledgeable personnel and transportation problems. Although many centers have funds for paying for transportation, frequent returns may mean several lost work days.

This practical consideration of the loss of family income makes imperative a knowledge of community resources which must include the availability of nutrition services and other types of follow-up services. One of the chief services on which we rely for follow-up is public health nursing, long a major link in the chain of continuum. In some communities, an untapped source of follow-up is the hospital dietitian and home economist working in a rehabilitation center.

Nutritionists are somewhat sparsely located in many states, but those available are dedicated and invaluable in their nutrition contributions. In those states fortunate enough to have nutritionists assigned to a number of geographical areas, the problem of providing follow-up becomes easier to solve. Unfortunately all states and local communities are not equally blessed in the availability of any services for the retarded and handicapped child.

From a nutrition standpoint, no one group requires more continuum of service than the child with phenylketonuria. Let me tell you about the follow-up provided by the nutritionists on a Maternity and Infant Project in one Alabama city for Michelle, a two year old PKU child.

I first saw Michelle during hospitalization over a year ago. Her parents were an intelligent, attractive young couple who displayed great annoyance toward our professional staff during Michelle's hospitalization. They were unhappy with hospital services, hospital food and being away from home so close to Christmas. On the day of Michelle's discharge from the hospital, a substitute dietitian gave the parents the wrong directions for the Lofenalac* formula for Michelle.

Fortunately, through the M & I nutritionist, we were able to send the correct formula and give the mother both supervision and support as solid foods were added to the diet.

In six weeks, Michelle and her parents were requested to return to The Center and it was found that Michelle had poor adherence to the diet with frequent ingestion of high protein foods. Once again, the nutritionist in the M & I Project was contacted and her visits continued. Communication was maintained both by letter and by phone.

As adherence to the diet continued to provide problems, the nutritionist realized the parents were becoming increasingly uncooperative. She referred them to a family counseling agency in the city. Several sessions were held with both the mother and father supplemented by visits from the nutritionist. The family counselor was able to help these parents verbalize their doubts concerning the necessity for Michelle's being on a phenylalanine-restricted diet and to help those of us in nutrition find new avenues of understanding through which to communicate.

Her latest report indicates phenylalanine levels of 8 mg% and somewhat better adherence of the diet.

This kind of continuum, however, required a great deal of time, coordination, phone calls, letters and involvement with other agencies. The communication in this case was excellent, but this is not always the case, particularly if we refer to another agency or discipline whose time may be a great problem.

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* registered trademark

The second child, with an equally difficult continuum problem is Rita. Rita is 5 years old, retarded, cerebral palsied, obese and almost completely helpless. Rita lives near The Center where she was evaluated. Her case typifies another problem in follow-up; too many people involved with too little communication.

Rita was first evaluated at age three. The Center's director of nursing became interested in Rita because of the many nursing problems she presented and began a home visiting program on a weekly basis. Through the nurse, I became involved and accompanied her into the home where the initial dietary evaluation was held. She was an interesting and challenging nutrition problem. Unable to walk, crawl or even turn over, Rita was like a huge lump of clay growing larger on each visit. Determining a low enough level of calorie intake for such an inactive child to initiate some weight loss seemed almost impossible. Finally, we set a top limit of 600 calories per day with a vitamin-mineral supplement recommended.

Later, Rita was referred to a rehabilitation center for physical therapy. Again, this team was concerned about her weight and the physical therapist referred Rita to their dietitian. At this point, the continuum of care was interrupted with a great lag in communication. The rehabilitation center requested no dietary or nursing information. Rita was placed on a 1200 calorie diet and on the nurse's last visit, she had gained two pounds, and the physical therapist had threatened to stop therapy because of her weight problem.

Recently, I discussed the case with the dietitian in which we agreed on objectives for Rita. We also decided that too many people were giving her mother dietary advice, so we're asking the nurse alone to work with the mother in carrying out our dietary suggestions. An increased concern for communication and better coordination of services could have prevented the occurrence of much of this problem.

The next child in which follow-up following hospitalization and evaluation provided a success story was Cindy. Cindy was in the hospital when nutrition services were requested. She was pale, undernourished and unable to retain the food she had been given at home. Cindy went home to Phoenix City with instructions for the mother to keep her sitting in a 45^0 angle and to feed her five small high protein meals a day.

The state director of nutrition services visited the child with the public health nurse and reinforced the hospital discharge instructions. When Cindy returned for a re-examination in two months, the vomiting was non-existent and her improvement was remarkable.

The last child I would like to describe is Billy, an 8 year old boy with Rubenstein's Syndrome. Billy weighed 67 pounds when first referred to the nutrition service. His upper teeth were missing, he could not say more than two words, was unable to feed himself and was not toilet trained.

Billy was selected as a special project for a graduate student in nutrition. Her project objective was to devise a weight control meal plan and teach Billy how to feed himself with a spoon and fork. She saw Billy and his mother once a week for the semester. The results were positive. Billy's weight decreased to 61 pounds, and he could feed himself well enough to be socially acceptable.

The next step in his follow-up will be a toilet-training program so that he will be acceptable for a group day program. Billy's case is typical of the time required for good follow-up.

The therapist in any discipline must recognize the importance of continuum of services when dealing with mentally retarded or developmentally handicapped children. This pertains particularly to nutrition services. Good continuum should be properly timed for the family's needs and requires intensive coordination of services, communication, time, a knowledge of community resources, personnel knowledgeable in dealing with retarded children and their families and individual consideration of the family.

When properly planned and carried out, continuum of nutrition services can mean the difference between good and bad dietary control.

REFERENCE

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Mary Anne Marshbourne Saadeh, M.S., R.D. *

AN APPROACH TO CONTINUITY OF NUTRITION SERVICES FOR THE CHILD WITH DIAGNOSED PHENYLKETONURIA**

The title suggests that we can offer a solution. We cannot. We have developed a procedure which hopefully provides some continuity of the NUTRITION services for children with phenylketonuria. There are still many problems to solve and we have probably experienced about any you could mention! In fact, we hope you will have some ideas and suggestions to help us establish more efficient and consistent continuity of nutrition services for our children with phenylketonuria and which in the future might be applied to other related areas.

There are now 96 children on the phenylketonuria case register in Florida. Of these, 43 are receiving Lofenalac*** and diet counseling from nutritionists; 43 more are in institutions; 13 others who are over 8 years of age and no longer taking Lofenalac*** are living at home but are not receiving nutrition services because they do have prescribed phenylalanine controlled diets. One child receives medical supervision and diet counseling through a child development center while their families buy the Lofenalac.*** This accounts for 100 children with phenylketonuria in a state of almost 6,000,000 population. Five infants were diagnosed as having phenylketonuria in 1968 for 1 case in 20,000 live births that year. In 1968, Florida had 99,998 live births. Phenylketonuria screening reports were made on an estimated 55% of these live births. Records reflect Florida State Board of Health Laboratory work in phenylketonuria screening but there is no mechanism for consistently obtaining records of tests made by private laboratories. Dr. Emily Gates, Pediatric Consultant, Florida State Board of Health, is greatly concerned about this and is aggressively working on ways to get phenylketonuria testing and reporting for all newborns since the testing law in Florida is a permissive one.

It is 1,200 miles from Pensacola to Key West. The current plan for nutrition services to children with PKU was developed with consideration of Florida's geography, county health department organization, population distribution, research in our medical centers and number and location of nutritionists. There are twenty-five nutritionists working through county health departments serving sixty-seven counties. The map shows the geographic areas covered by each regional nutrition consultant (Figure 1). In addition there are nutritionists employed by four county health departments and in the two child development centers.

Since 1966, nutrition services for the children with phenylketonuria in Florida have been incorporated into the generalized state nutrition program and increasingly coordinated with services of the Bureau of Maternal and Child Health and Child Development Centers. The nutrition consultant in maternal and child health coordinates these services for the Division of Nutrition.

In 1966, when these procedures were developed there were only seven children with phenylketonuria known to nutritionists in Florida. Realizing this the Director of the Division of the Nutrition reviewed the phenylketonuria case register and found that at that time there were 35 children living at home who received Lofenalac.*** Most of the children with phenylketonuria who were receiving Lofenalac*** from the Florida State Board of Health had no diet prescribed by a physician. It then seemed urgent, as a first step to develop a procedure so that each child would be on a phenylalanine controlled diet and would receive coordinated medical supervision, laboratory testing and diet counseling as the VERY MINIMAL services for control of phenylketonuria. Families needed diet counseling to be able to follow diets prescribed by the physicians and monitoring of blood levels to determine success of diet controls. This required close cooperation among supervising physicians, laboratory staff and nutritionists.

To identify the families needing diet assistance the therapeutic consultant suggested that the Division of Nutrition take responsibility for Lofenalac*** distribution. Prior to that time Lofenalac*** was mailed from the State Board of Health to county health departments where public health nurses delivered it to families. When first

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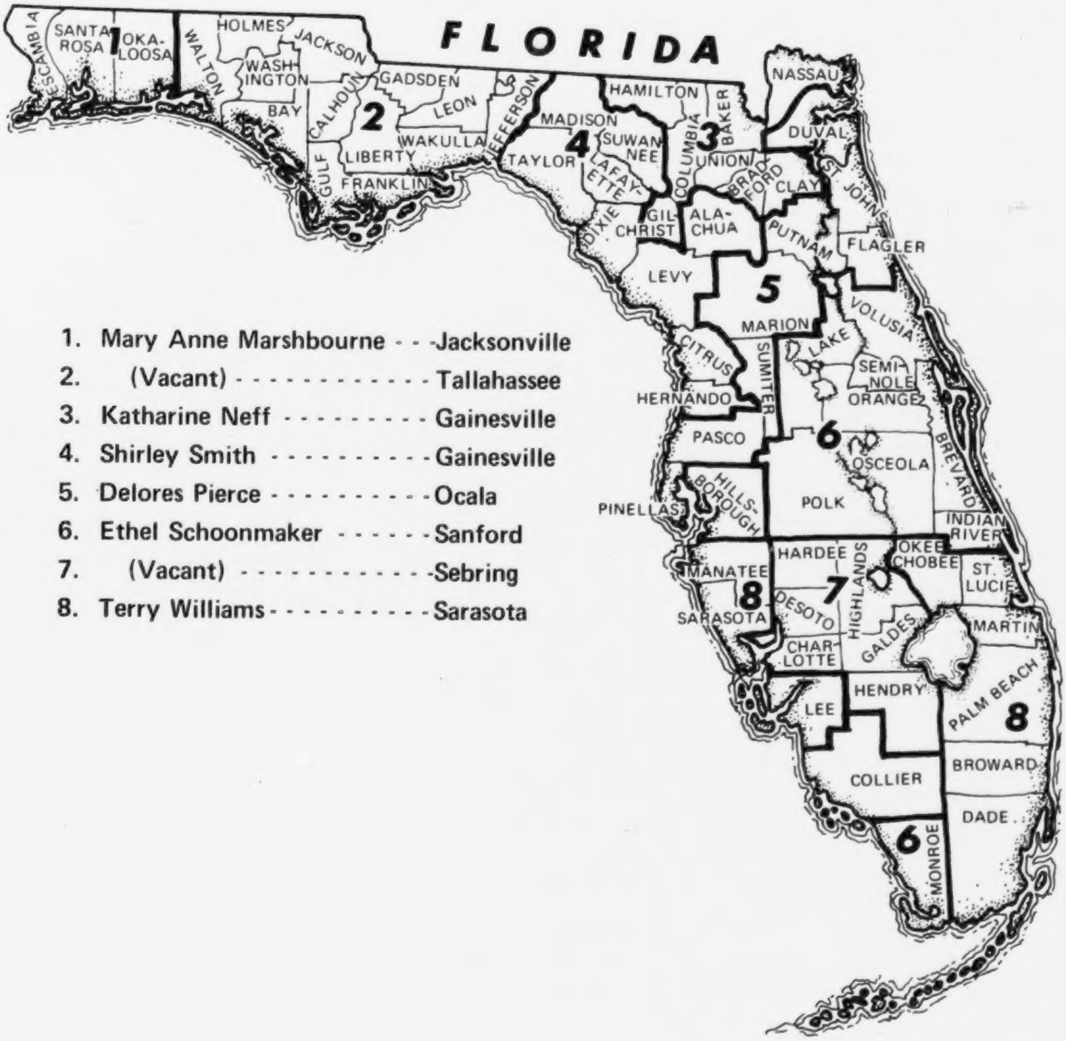
[*] Nutrition Consultant, Florida State Board of Health, Jacksonville, Florida 32201

[**] Presented at Nutrition Workshop, Child Development Center, June, 1969

[***] registered trademark



FLORIDA
ESCAMBIA
SANTA ROSA
OKALOOSA
1
WALTON
HOLMES
JACKSON
WASHINGTON
BAY
CALHOUN
GADSDEN
LEON
2
LIBERTY
WAKULLA
GULF
FRANKLIN
JEFFERSON
MADISON
4
TAYLOR
SUWANNEE
LAFAYETTE
HAMILTON
COLUMBIA
BAKER
3
UNION
NASSAU
DUVAL
BRADFORD
CLAY
ST. JOHNS
DIXIE
GILCHRIST
ALACHUA
PUTNAM
FLAGLER
LEVY
5
MARION
VOLUSIA
LAKE
CITRUS
SUMITER
SEMINOLE
ORANGE
HERNANDO
PASCO
6
OSCEOLA
BREVARD
HILLSBOROUGH
PINELLAS
POLK
INDIAN RIVER
HARDEE
HIGHLANDS
OKEECHOBEE
ST. LUCIE
MANATEE
8
7
DESOTO
SARASOTA
MARTIN
CHARLOTTE
GALDES
PALM BEACH
8
HENDRY
LEE
BROWARD
COLLIER
DADE
6
MONROE

1.	Mary Anne Marshbourne	Jacksonville
2.	(Vacant)	Tallahassee
3.	Katharine Neff	Gainesville
4.	Shirley Smith	Gainesville
5.	Delores Pierce	Ocala
6.	Ethel Schoonmaker	Sanford
7.	(Vacant)	Sebring
8.	Terry Williams	Sarasota

Figure 1

suggested it looked as if nutritionists might become messengers. However, as finally developed, the United States Post Offices became the messengers and delivered Lofenalac* directly to families from the State Board of Health while nutritionists and health department staff obtained the information they needed to assist the families. The nutrition services offered included:

1. Distribution of Lofenalac* by an established office procedure handled by the Division of Nutrition secretary.
2. Nutrition and diet consultation to physicians in outlying areas to provide practical information about the prescribed diet as needed. This has been generally welcomed by the physicians.
3. Diet consultation to public health nurses in health departments to prepare them for the diet counseling aspect of health supervision they provide to families who have children with phenylketonuria.
4. Diet counseling to families from nutritionists who work through child development centers and/or county health departments.

Forms were needed to make the procedure operate. The forms developed were:

1. Phenylketonuria Case Report - This form provides for a brief history and data used to make the diagnosis. The completed form is mailed by the physician to the Bureau of Maternal and Child Health where the name is entered in the phenylketonuria case register after the form is signed by the pediatric consultant. Only children determined by clinical diagnosis to have phenylketonuria and who are on the case register are eligible to receive Lofenalac* from the Florida State Board of Health.

2. Request for Nutrition Services and Lofenalac*- Each child receiving Lofenalac* must be on a physician prescribed diet so that all sources of phenylalanine are controlled and the physician takes responsibility for the degree of control. Lofenalac* must be distributed so that the amount required for the prescribed diet is available to the infant or child. This completed form with the up-to-date diet prescription and recent laboratory tests, child's age and weight is mailed to the Division of Nutrition periodically to provide the family with the Lofenalac* they need. The form includes space for name of person giving diet counseling and the address for mailing Lofenalac*. The physician who signs the form requests the number of cases needed, usually one to two month's supply. Requests should coincide with laboratory testing and visits to the physician.

3. Diagnostic Criteria and Management of Phenylketonuria - A two page guide to diagnosis and management was prepared by the then Director of Bureau of Maternal and Child Health to give concise information to the physician (addenda).

Later one other form was developed to improve nutritionist's reporting of progress.

4. PKU Case Report for Six Month Period - The nutritionist giving diet counseling makes a six month summary for each child with phenylketonuria. When more than one nutritionist is involved, the information is summarized by the nutritionist with primary responsibility. Others supply information to the nutritionist completing the summary through letters and copies of reports.

Procedures for nutrition services for children with phenylketonuria are illustrated through two fictitious composite family experiences:

> Robert Harrington was born in a small county hospital. Because Robert's first Guthrie test was elevated to greater than 20 mg%, Dr. Midland referred him to the Child Development Center about 100 miles away from his home for further testing. The Child Development Center was staffed with a pediatrician knowledgeable in metabolic errors, laboratory technician, nutritionist, pediatric nurse, psychologist, medical social worker and physical therapist. If Robert did have phenylketonuria, he would need all these resources.
>
> Robert's diagnosis was phenylketonuria. Mr. and Mrs. Harrington had one other child age 8 who was doing well in school. The Harringtons had never before heard of PKU. Dr. Kidd, Pediatrician at the Child Development Center, in the first of many sessions explained the metabolic error, PKU. He told the Harringtons that treatment for Robert would be a phenylalanine controlled diet with frequent laboratory tests to determine response to the diet. Periodic evaluation of development would be made. Dr. Kidd explained that the Florida State Board of Health would supply the amount of Lofenalac* prescribed. Mrs. Starr, Nutritionist, would interpret the diet. Dr. Kidd completed the PKU Case Report to mail to the Bureau of Maternal and Child Health and Request for

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Nutrition Services and Lofenalac* to mail to the Division of Nutrition.

Mrs. Starr interpreted the phenylalanine controlled diet for Robert. She sought to make this information as clear and simple as possible. She showed Mrs. Harrington how to prepare one day's supply of Lofenalac*--showing how the Lofenalac* powder goes into solution, how the formula looks, smells and tastes and the amount of milk to add. Mrs. Starr told the Harringtons she would ask Mrs. May, Regional Nutrition Consultant with the Florida State Board of Health, to visit them at home to answer questions that may arise during the month until they returned to the Center. Mrs. Starr explained that she and Mrs. May maintained close liaison--that Mrs. May would visit the Harringtons at home while Mrs. Starr would see them at the Center. Food additions and diet changes would be communicated to Mrs. May to give in the home. Other times, they would be made when Robert came to the Child Development Center. This would prevent travel expense for the family except for periodic evaluation visits. Mrs. Starr summarizes Robert's progress every six months in a progress report which she mails to the Division of Nutrition. Copies are sent by the Division of Nutrition to the Bureau of Maternal and Child Health and to Dr. Midland.

To summarize the procedure then, Robert's diet was ordered by Dr. Kidd in the Child Development Center. Initial diet interpretation was given by the Child Development Center nutritionist. All diet changes were made by the physician in the Center. These are interpreted by the Child Development Center nutritionist when the family is in the Center or communicated to the regional nutrition consultant for interpretation when the child is at home. The regional nutrition consultant visits the family to give overall family nutrition counseling and for practical application of the phenylalanine controlled diet within the family setting. She gives inservice education on the diet in PKU for public health nurses who can then give supportive diet counseling along with other health supervision. She gives Dr. Midland consultation on dietary management for PKU.

Rodney Stoval was born to parents who had two other children on a phenylalanine controlled diet. A Guthrie test, done in the hospital laboratory after forty-eight hours on hospital formula, was 36 mg%. Six days later it was 52 mg%. Dr. Allen, attending physician, told Mrs. Stovall to begin Lofenalac* formula and he called Mrs. Jeter, County Nutritionist. Mrs. Jeter has worked with Dr. Allen for three years to give diet counseling for children with phenylketonuria. The PKU Case Report and Request for Nutrition Services and Lofenalac* were completed and mailed.

Mrs. Jeter, Nutritionist, maintains frequent telephone contact with Mrs. Stovall. She also makes home visits to give diet counseling. Mrs. Stovall has been preparing phenylalanine controlled diets for six years. However, she needs encouragement and has found a review of formula preparation helpful. Mrs. Stovall is ready to read any literature on diet. The oldest Stovall child is in the first grade and eats lunch served at school. He continues on a phenylalanine controlled diet because he is less hyperactive and can learn more easily. Nutrition services include planning with school food service, classroom teacher and the child for acceptable foods.

The Stovalls do not live near a child development center. However, they have an understanding public health nurse who has helped the family with total health care. Dr. Allen expects to refer the family to a child development center for complete diagnostic work-up and evaluation for all three children. He has been pleased to learn that funds are available from the center which is 250 miles away for transportation so the trip will not be a hardship on the family. Dr. Allen would like to have an interdisciplinary evaluation for the children.

Successful coordination of nutrition services for children with PKU is dependent upon cooperation of all involved; public health nutritionists, pediatric consultants, child development centers, private physicians, health officers, hospital dietitians and public health nurses. As stated earlier the procedures described were developed to meet an immediate need to improve basic services. Since that time a new pediatric consultant with a Technical Advisory Committee is concerned with developing a plan for improved detection, diagnostic and supportive services, of which nutrition will be an important part of the whole. There are many problems and obstacles still to overcome.

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1. More professional education is needed for all disciplines involved in care of children with PKU. This would include physiology of inborn metabolic errors, anticipated growth and development of children with metabolic errors and practical application of treatment including contributions that can be made by each discipline and available resources.

2. Adequate testing for screening, diagnosis and follow-up to determine physiological response to diet. All newborns are not now screened for PKU. At the present time laboratory results for all newborns who are tested and all children with known PKU are sent to the Bureau of Maternal and Child Health. Elevated test results are reported to attending physicians by letter and followed-up with a phone call if a repeat test within normal range is not reported within one month.

Some families apparently do not adequately appreciate the importance of laboratory monitoring and do not consistently take their children to their physician for tests. In some other cases, doctors request Lofenalac* without supportive laboratory tests.

3. Physicians, nurses and nutritionists are asking for printed guide materials. A booklet on the diet for PKU to use with parents has been prepared by the Division of Nutrition and is now ready for trial use.

4. The phenylalanine controlled diet becomes increasingly difficult for families to cope with as the child grows from infancy and infant foods to table foods. If the child has failed to develop eating habits including a variety of foods, but rather depended almost solely on Lofenalac* for vitamins and minerals, eating problems can be expected when Lofenalac* is discontinued. Behavior problems develop in over-protected children of anxious parents. Mental retardation can result in those children who do not consistently follow a phenylalanine controlled diet adjusted for growth.

5. Coordination of medical, laboratory and nutrition services is a problem. Coordination is probably easier for those of you who work in centers. Because you work as a team, information is more readily accessible and informal communication is easier. In the field, coordinating services of people geographically widely separated and often in more than one agency is more difficult.

We have a procedure for Lofenalac* distribution and continuity of nutrition services for children with PKU. It has many limitations. Children with PKU need many services. A basic need is for comprehensive diagnostic work-up and periodic evaluation. Children with PKU are first of all children. They and their families face all the usual needs for medical supervision of growth and development. In addition, families have special needs for counseling in how to guarantee as normal physical, mental and emotional growth and development as possible and/or how to cope with any deviations that develop. Nutritionists need to work with the Bureau of Maternal and Child Health Pediatric Consultant and Child Development Centers toward incorporating nutrition services as a part of the comprehensive plan for care for children with phenylketonuria.

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ADDENDA

DIAGNOSTIC CRITERIA AND MANAGEMENT OF PHENYLKETONURIA

These recommendations are based on currently accepted concepts of phenylketonuria and its management.

A screening capillary blood test usually obtained by heel-stick (Guthrie Bacterial Inhibition Assay) for elevated concentration of phenylalanine performed no sooner than 24 hours after onset of milk feeding and prior to discharge from the hospital is recommended for all newborn infants. Normal premature infants because of liver immaturity may show transient elevation of serum phenylalanine. They should be tested at two weeks of age and again before discharge from the hospital if the first sample is negative. An additional Guthrie test for all negative infants should be performed at four to six weeks of life to prevent missed cases. Guthrie test materials may be obtained from county health departments.

Phenylalanine levels cited in the following discussion are intended as a guide to clinical management and are not considered absolute. Clinical judgment and careful interpretation of borderline situations are essential. Guthrie tests are interpreted as follows:

4 mg % or less	- NOT SUSPICIOUS
Greater than 4 mg %	- SUSPICIOUS

Suspicious findings demand intensive follow-up and evaluation by serial serum phenylalanine determinations (venipuncture). A minimum blood sample of 2.5 cc should be obtained, declotted and promptly centrifuged (to reduce artifactual readings from hemolysis) to yield at least 1 cc of clear serum which may be submitted to the laboratory in a common serology tube without refrigeration. The first sample obtained should also be tested for tyrosine to eliminate the possibility of tyrosinosis which may falsely elevate the phenylalanine level. In the early stage of diagnosis, tests should be repeated every three to four days. Initial findings in the range of 15 mg % with rapid rise to as much as 30 mg % is typical of phenylketonuria. Transient phenylalanemia or persistent elevation at lower levels in the range of 4 - 10 mg % are often typical of the heterozygous state (trait, not the disease). Simultaneous testing of apparently normal parents and siblings may confirm this situation.

Guthrie and serum phenylalanine determinations may be obtained from the ***Bureau of Laboratories, Florida State Board of Health.*** At the present time two of the public health laboratories perform these tests:

Miami Regional Laboratory
1350 N. W. 14th Street
Miami, Florida 33125

Central Laboratory
Florida State Board of Health
P. O. Box 210
Jacksonville, Florida 32201

When there is persistent elevation in the order of 10 -15 mg % or higher, the baby should be placed on phenylalanine restricted diet. The aim of therapy is to maintain serum phenylalanine levels in the range of 3 - 7 mg%. In order to confirm the diagnosis, the baby may be challenged by restoring normal diet or utilizing a loading diet but this should not be done in case of the premature until he has reached five and one-half pounds body weight and is thriving. If the serum phenylalanine again reaches high levels (15 mg % or greater) on this challenge, the diagnosis of phenylketonuria may be considered confirmed. During the testing interval the Phenistix Test may be usefully employed in day-to-day observation before results of the serum test are available and, if positive, is helpful in confirming the diagnosis.

The methods of diagnosis in the infant are not changed where there is a familial history of phenylketonuria but this situation requires aggressive diagnostic efforts. Where there is positive familial history of mental retardation or phenylketonuria the mother's serum phenylalanine should be determined early in pregnancy. While the situation occurs infrequently marked elevation of maternal serum phenylalanine may lead to the anomalous situation of brain damage in the fetus before birth and introduction to a normal (high phenylalanine) diet.

In the long-term management of diagnosed cases after restrictive diets have been instituted, serum phenylalanine determinations should be obtained every few weeks at first and every few months after stabilization. A minimum level of phenylalanine is essential to proper nutrition, an excess is dangerous to mentality. The desired therapeutic goal is to maintain the serum phenylalanine level between 3 to 7 mg %.

The phenylketonuric infant and child will require a phenylalanine restricted diet indefinitely. The only commerically available product is LOFENALAC - (Mead Johnson Laboratories). Lofenalac alone is seldom suitable even for small infants. Small calculated amounts of cow's milk must usually be added to supply essential amounts of phenylalanine. Serial phenylalanine determinations must be performed to insure that serum levels do not fall below levels consistent with maintenance of proper growth (3 - 7 mg %). Older infants and children eating solid foods will require careful calculation of other food items to restrict phenylalanine with the addition of Lofenalac to supply essential protein. The diet plan needs to be varied with activity, age, physiological periods of growth spurt and psychological tolerance. Because the problem of management is complex, involving not only the child but his family, the continuing supervision of the diet by the public health nutritionist will be of considerable assistance to the family physician or pediatrician. The best measure of success is acceptance of the prescribed diet by the child and his family with periodic serum phenylalanine determinations consistently within the therapeutic range (3 - 7 mg %). The table below will be of use to the physician both in writing the initial diet prescription and in long term management.

Age	Phenylalanine (mg per lb.)	Protein (gm. per lb.)	Calories (per lb.)	Measures of Lofenalac (Tbsp. per lb.)
0-3 mo.	20-22	1.4	60-65	1 1/4 - 1 1/2
3-12 mo.	18-20	1.1	55-60	1 - 1 1/4
1-3 yrs.	16-18	1.1	50-55	3/4 - 1
3-7 yrs.	10-16	1.0	40-50	1/2 - 3/4

Children's Bureau Publication No. 338, 1965

After a case of phenylketonuria is confirmed and reported to the Bureau of Maternal and Child Health, a request for Nutrition Services and Lofenalac, along with a recent report of serum phenylalanine determination, should be directed to the ***Division of Nutrition,*** Florida State Board of Health, P. O. Box 210, Jacksonville, Florida 32201.

E. Henry King, M. D., Director
Bureau of Maternal and Child Health
Florida State Board of Health

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Rev. 5/68

Bill Collins, Ph.D.*

ANATOMY AND PHYSIOLOGY OF ORAL MUSCULATURE AS RELATED TO SPEECH**

Introduction:

The mouth or oral cavity serves several important functions for the human body. The primary function of the oral cavity is the vegetative function of intake and mastication of food. Another important function of the oral cavity and its related anatomical structure is the production of speech. Although the oral cavity serves for both vegetative and communicative purposes, the function of the oral musculature for each purpose is different. The reader should review the specific muscles of the oral area in another source because the aim of this paper is only to demonstrate briefly how the oral cavity serves both the vegetative and communicative purposes.

Many muscles are associated with the oral area of the face and their attachments permit multiple and varied movements of the mandible and tongue, the two major components of the oral structures utilized for both eating and speaking. The size of the oral cavity must be adjusted to surround the food to be bitten and masticated; the size of the oral cavity is also adjusted during speech production. During mastication the tongue is active in manipulating food between the teeth until the desired consistency is achieved; the tongue is also active during deglutition. The tongue is also the primary articulator of speech sounds; however, the movements of the tongue during chewing and swallowing are quite different from the movements utilized for speaking.

Speech Production:

Speech has five basic requisites: 1) intact central nervous system (CNS), 2) respiratory mechanism, 3) phonatory mechanism (larynx), 4) resonance chambers and 5) articulators. The CNS provides the bases for acquiring language and the control of the anatomical structures that are utilized for the production of speech sounds. The driving force for speech is expired air that escapes through the trachea and through the vocal folds. During quiet breathing the vocal folds are abducted and do not vibrate; however, when sound is required for speech, the vocal folds approximate and the escaping air is set into motion. As the vibrating air passes through the pharynx, the shape of the pharynx is modified and resonance is achieved. Resonation of sounds does not occur only in the pharynx; the oral cavity provides oral resonance during articulation, the final step in speech production.

The articulators are the: 1) mandible, 2) lips, 3) teeth, 4) tongue and 5) hard and soft palates. The articulators modify the escaping air stream by momentarily stopping or constricting air flow depending on the speech sounds to be produced. Obviously, then, the articulators are also utilized in feeding, and any defect in either the structure or function of the oral tissue may affect both feeding and speaking.

Mandible:

During speech production constant and rapid changes are required in the size and shape of the oral cavity. These changes are achieved by moving the mandible up and down or by spreading, opening or closing the lips. Because of the mandible's attachment to the temporal bone, tempero-mandibular joint, the mandible is capable of many varied movements. The two movements most common during eating are opening, lowering and closing, raising. These movements are also important in normal speech. The masseter, the temporalis, the external and internal pterygoid muscles are the principal elevators, or "mouth-closers." A number of muscles affect mandibular depression, "mouth-openers," principally the suprahyoid group and especially the mylohyoid, part of the digastric, and the geniohyoid. The movements of the mandible also affect the movements of the lips.

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Lips:

The lips are capable of many varied movements which are required for both speaking and eating. The primary lip muscle involved during articulation is the orbicularis oris. Lip movements are necessary in the production of certain consonant sounds and is a usual concomitant of some vowel sounds (Huntington, 1968). The lips may be closed, thus stopping the flow of air, as in the production of the sounds /p/ and /b/, the first sounds in ***pea*** and ***be.*** The lips may be rounded as in the production of /u/, the middle sound in ***food;*** spread as in the production of /i/, the final sound in ***be;*** or open and somewhat spread as in the production of /s/ and /z/, the first sounds in ***Sue*** and ***zoo.***

Tongue:

The tongue is a muscular mass that fills the mouth when the mouth is closed. The tongue is capable of more varied movements than any of the articulators. The tongue may actually be classified as three articulators, the tip, the blade and the dorsum. The tongue tip is the fastest moving of all the moveable articulators. The tongue, as well as the lips, may either stop the flow of air during speech or it may only impede or constrict the flow of air. The tip of the tongue protrudes between the teeth thus constricting the flow of air in the production of /θ/ and /ð/, the first sounds in ***thumb*** and ***this.*** The tongue tip is pressed against the alveolar process of the maxilla and momentarily stops the flow of air in the production of /t/ and /d/, the first sounds in ***to*** and ***do;*** the tip of the tongue is pressed against the hard palate for the production of /l/, as in ***low,*** and the dorsum of the tongue contacts the soft palate in the production of /k/ and /g/, the first sounds in ***coal*** and ***goal.***

Hard and Soft Palates:

In addition to serving as points of contact for consonants requiring tongue and palatal contact, the hard and soft palates separate the oral cavity from the nasal passages and provide resonant qualities to speech. During feeding the palates prevent regurgitation of food and liquid through the nasal passages.

Production of speech sounds requires rapid movement of the articulators just as the movements of the same structures during feeding must be rapid. Any disorder affecting feeding is also likely to affect speaking. To ascribe more importance to the oral structure for either feeding or speaking is arbitrary; further, to describe the chronological sequence of either task is difficult because of the rapidity with which the various movements occur.

Specific Disorders Affecting Feeding and Speaking:

Many disorders can interfere with feeding and speaking. Some disorders are directly related to structural defects, and in other disorders the anatomical structure may be intact but the structure does not function adequately. In other disorders a combination of structural and functional deviations occur.

Labial and Palatal Clefts:

A congential structural anomaly affecting both feeding and speaking is labial and palatal clefts. Clefts may occur in many different combinations; a patient may have a cleft of the lip only; a patient may have clefts of both the hard or soft palates only or both labial and palatal clefts may be present in the same patient. A cleft lip may prevent a tight seal between the patient's lips and the nipple, thereby limiting his ability to suck. A congenital cleft of the hard palate inhibits sucking because the tongue is without a hard surface to assist in sucking. A cleft of the soft palate may permit regurgitation of the liquid through the nasal passages. These same structural deviations prevent normal speech production. Depending on the types and combinations of clefts, the articulatory skills may be deviant because of the structural differences, even with surgical and prosthetic intervention. In addition to the articulatory errors related to clefts of the lip and palates, the resonatory quality of speech is probably the major handicap.

Palatal insufficiency or inadequacy, from either a structural or functional cause, prevents adequate velopharyngeal closure. Without adequate velopharyngeal closure the patients will produce speech with too much nasal resonance. Although labial and palatal clefts are the most common congenital structural anomaly affecting feeding and speaking, other anomalies do occur which interfere with feeding and speaking such as mandibular malformation in Pierre-Robin Syndrome.

Functional Disorders:

The neuromotor disorder that most often interferes with feeding and speaking is cerebral palsy. The patient with cerebral palsy has a problem in controlling the oral musculature for feeding and speaking. The major handicap to speaking is related to the incoordination of the structures used for speech production. Speech requires rapid changes in the size of the oral cavity and speech also requires the coordination of all oral structure for adequate, intelligible sound production. Any neuromotor disorder affecting muscles in the oral region may result in speech that is difficult to understand.

Conclusion:

The vegetative function of the oral cavity is its primary function; speech is an additional or overlaid function man derives from the oral cavity. The oral cavity serves as the usual place for intake of food; the oral cavity serves as the usual place for the escape of speech sounds into the environment. The mandible, lips, teeth, tongue and palate are used for biting, chewing and swallowing food; these same structures are used for articulating speech sounds. If an inability caused by either a structural or functional disorder interferes with feeding, compensatory methods of feeding must be taught. If a structural or functional disorder interferes with speech production, compensatory methods for speaking must be taught. Because the development of vegetative functions of the oral structure in feeding precedes the development of voluntary movements required for speech, the speech pathologist will probably work closely with other team members in the habilitation of the handicapped child with feeding problems.

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Vaughn E. Stimbert, Ph.D. *

PSYCHOSOCIAL ASPECTS OF FEEDING**

Psychosocial refers to those aspects of feeding primarily under the control or influence of environmental factors--those factors that can be manipulated or changed by persons in daily contact with the handicapped child. It is well known that variables such as dining room size, number of persons eating, number of persons per table, food quality and attractiveness, furniture size and type, noise level, amount and type of supervision, the behavior of other children in the immediate area, etc., interact with subject variables such as age, size, intelligence, type of handicap, food preferences, social skills, etc., to determine eating performance. While such obvious environmental influences are no doubt important, they probably become less important as the degree of handicap becomes more severe. On the other hand, many subtle, often un-noticed interactions, hold the key to modifying the feeding behavior of the handicapped child. The focus of this paper will be on one such interaction, typically referred to as a reinforcement contingency. The emphasis will be on the use of reinforcement to develop appropriate feeding skills in the handicapped child. Topics to be covered are: (1) some comparisons of the development of feeding behavior in normal and handicapped children, (2) techniques relevant to modifying feeding skills, (3) implementing programs in feeding training.

Some Comparisons of the Development of Feeding Skills in Normal and Handicapped Children:

Feeding is assumed to be a natural function in most organisms. It is one which develops to a functional level with very little effort on the part of the child's parents. Even the adept use of utensils is acquired very rapidly, often without direct teaching. It appears that many of the most complex aspects of feeding can be acquired through a combination of practice and observational (imitative) learning.

Numerous feeding problems are associated with normal child development (e.g., dawdling or picky eating); however, most of these are transient in nature and pose more of a problem to the parent than to the long term adjustment of the child. Although there are many social and cultural factors involved in determining the types of food which people eat, the amount they eat and the occasion upon which they eat, the basic feeding skills are generally taken for granted in the same way as language. Most children learn to speak without the services of a child development specialist. Even in homes with grossly inadequate child rearing practices, most children appear to learn the basic speech and eating skills. The progressive steps in attaining feeding skills are covered in another chapter.

The handicapped child, in contrast, may have one or more deficient mechanisms which preclude the normal acquisition of feeding behavior. For example, he may be physically handicapped and not have the basic muscle movements necessary for adequate performance. This problem is also analyzed in some detail in other chapters; however, without skilled help, such a child will quickly cease to improve his attempts at eating and compensate through socially unacceptable means (e.g. eating directly off the plate). The handicapped child may be retarded intellectually and fail to profit from training which is not specifically designed for his learning abilities. If he does not readily acquire behaviors through imitative processes, he also may be quickly frustrated in his efforts and resort to alternate, unacceptable behaviors in a manner similar to the physically handicapped child.

Whether the child is physically handicapped, mentally handicapped or both, in many cases he will be deficient in feeding skills unless specialized programs are systematically utilized. All the encouragement, prodding, punishment or rewarding may be for naught if they are not carried out in a systematic manner within a sound framework of scientifically based procedures. Thus, the point to be made is that handicapped children respond differently to the same circumstance which produce "normality" in other children. It is essential to recognize that the handicapped may require not only more patience and time in learning a specific skill, but that completely different, sometimes highly technical, approaches may be necessary. This brings us to another difference between

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

the handicapped child and the normal; that other people respond differently to a child who is identified as "handicapped."

Most children are picked up when they cry, their questions are answered, their "precocious" behaviors are responded to with great delight and in general they receive extensive social attention and praise contingent on their behavior. In contrast, the handicapped child receives less and less contingent stimulation as he grows older while the normal child is typically receiving more and more. Similarly, noncontingent stimulation increases in the handicapped child as he grows older; whereas, it probably decreases in the normal child. It is obvious why this occurs, for as the normal child's repertoire is increasing and he is developing more and more independence, society responds by requiring more and more of him. As the handicapped child grows older, his skills relative to the normal child become more and more deficient and because he cannot meet the same requirements as the normal child society requires less and less of him. In many instances his diapers are changed, he is fed and other needs are responded to at the convenience of his caretakers rather than in a fashion which would be optimal for his development.

This shift toward noncontingently meeting the child's needs is unfortunate for recent work in psychology has clearly demonstrated that the handicapped and/or retarded profit maximally from situations which set up minimal response requirements which have to be met before the environment responds. As stated earlier, developmental processes are usually taken for granted in the normal child, yet those features which are essential for normal development are not routinely applied to the handicapped. The result is a double handicap: the handicap of being deficient in one or more areas of development and the handicap of not being exposed to those features of the environment which could lead to more normal functioning.

One feature of eating is common to both types of children. It is an activity which occurs frequently and where the child is expected to perform at least three times per day for periods ranging from 15 minutes to 1 hour. As such it can be a behavior used by the child to control a part of his environment for part of the time. It also, of course, offers the opportunity for others to control the child and if they do not like the way he eats, may provide an unpleasant situation which the child may attempt to avoid. This avoidance behavior may generalize to other situations and generate chronic habits which may radically affect his social adjustment and learning in other situations. Eating may thus serve a variety of purposes quite apart from the nutritional needs of the child which are met or from the intrinsic enjoyment most of us find in the taste of food.

Techniques Relevant to Modifying Feeding Skills:

In spite of its importance in the "humanization" or "socialization" of the handicapped, the amount of custodial care required, etc., the development of feeding skills in this group has not been extensively researched or discussed in the psychological literature. More dramatic but often less widespread problems have received the focus of attention. There are, however, two major areas of concern in developing feeding skills. One is messy or disruptive behavior, such as spilling food, throwing food or stealing it and the other is the appropriate use of utensils. Both of these make up what we typically call mealtime behavior (Barton, Guess, Garcia and Baer, 1970).

In recent years, the principles of operant conditioning have been applied to numerous problems of human behavior (Franks, 1969; Ulrich, Stachnik, and Mabry, 1966; Ulrich, Stachnik, and Mabry, 1970). Some have been directly concerned with improving the eating habits of the handicapped child (Barton, et al., 1970). Although the application of learning principles to some of the more difficult problems of development has shown considerable promise, there are still those who question its efficacy over other, more traditional, forms of therapy. Although each case is unique and it is difficult to say what might have happened had different techniques been used, it is amply clear that operant conditioning has been effective with a wide variety of problems not substantially improved with other forms of therapy. Its value with the handicapped child has been particularly impressive although much remains to be done in extending this technology to the full range of behavior problems in children.

The techniques of operant conditioning which are essential for teaching feeding skills will be covered in the remainder of this section. The emphasis is always on the importance of a single subject as the legitimate unit of study for only after successful programs have been developed for individual problems does the extension to larger numbers or groups become worth considering.

Baseline Data:

Before any training procedures are begun, information must be collected on the feeding skills presently demonstrated by the child. This is typically done by selecting a consistent period of time and counting the number of times the child makes a well-defined response felt to be relevant to feeding. The number of bites taken, the amount of food spilled, number of times the spoon was held properly, etc., could all be easily recorded during a fixed period of time. It is the author's opinion that unless the therapist is willing to invest the extra time necessary to record data, the success of the treatment program is jeopardized. Without some objective measure of performance prior to feeding training, there is no way of evaluating program success. Without a feeling of accomplishment based on fact, the tedious and time consuming process of shaping more appropriate skills will take a high toll of manpower. People cannot and should not be expected to expend vast amounts of time and energy without some clear indication that such resources are being well spent. There is nothing more personally rewarding than to be directly responsible for marked improvements in a handicapped child's behavior over a relatively short period of time, particularly when years may have gone by without notable change. The dual purpose of baseline data is to serve as a standard by which improvement is judged and to provide a data base upon which therapeutic procedures can be analyzed, instituted and when indicated, modified. A recent study (Barton, et al., 1970) demonstrates clearly the use of baseline measurements in assessing feeding problems in a handicapped population. After recording a variety of behaviors during the baseline period, these authors demonstrated how each behavior was systematically modified by contingent events. Initially it would not be wise to attempt such involved procedures; however, with experience, a wide range of techniques can be competently employed.

The Reinforcement Relationship:

Reinforcing more appropriate eating skills is somewhat paradoxical from the standpoint of experimental psychology. For seventy years, eating and drinking have served as primary rewards in studies of learning, but have rarely been studied as responses capable of being learned or modified. Now we are talking about reinforcing eating, which in years past would have been thought to be theoretically impossible, for it was thought that eating was a reinforcing event but not a reinforcible one. Recently, however, it has been pointed out by Premack (1965) and his colleagues that all that is necessary for an event to be reinforcing is that it be more probable than another and that the more probable response be made contingent on the less probable response. This was demonstrated repeatedly by showing that rats would drink in order to have the opportunity to run if they had been satiated on water and deprived of running. Under these conditions, animals might drink some three to four times their normal intake of liquids in order to free an activity wheel. Thus, the old saying "you can lead a horse to water but you can't make him drink" may not be consistent with the latest in behavioral technology. It is important to realize that the acquisition of feeding skills can be legitimately thought of as just another set of responses to be learned and that reinforcement of these behaviors is feasible both from a practical and theoretical viewpoint.

First, some event which is highly probable must be identified. Some children will prefer candy, toys, trinkets, attention or sips of a favorite drink to scooping up food with a spoon. These preferences are the prime candidates to serve as reinforcers for the improvement of feeding skills. The next step is to select the aspect of feeding that the child should improve first. This might be a skill that the child has available but rarely performs and would practically assure initial success. After the rate of this behavior has been increased, another slightly more difficult behavior should be selected for reinforcement. This procedure can be continued until all critical behaviors have been learned. These can then be chained together by reinforcing increasingly longer combinations until a complete sequence is attained. One effective procedure is referred to as backward chaining and involves the reinforcement of the last (terminal) response first. For example, the spoon is loaded for the child and it is guided to the child's lips; however, the child is required to finish the sequence without help. By gradually requiring the child to accomplish steps further and further from the terminal response, the entire chain may be acquired. The use of very small discrete bits of behavior with single sessions focusing on a limited number of responses which the child performs successfully usually results in rapid improvement, particularly if the child has some strong preferences (reinforcers). It is not unusual for more to be accomplished with a few simple responses reinforced per session than when many responses of inferior quality are obtained. The tendency of most people is to expect too much per session. Good results can be obtained with such modest expectations as only one good reinforced response per session particularly in the early stages of training.

An analysis of the child's behavior may suggest that some skill is prerequisite to others and should be taught early in the sequence. For instance, chewing may be a prime deficiency which when corrected will lead to the rapid development of other behaviors. Because of the wide range of skills found in the handicapped and the long history of reinforcement or nonreinforcement for certain behaviors, it is absolutely essential that each child's specific skills are studied and utilized in so far as is possible in remediating his deficits.

Prompting is another crucial aspect of acquiring reinforcement contingencies and refers to various procedures whereby the appropriate response is facilitated by the therapist so that reinforcement can be delivered. Holding the child's hand around the spoon, guiding it to his mouth, pointing to the utensil to be picked up, etc., are all examples of prompting. Prompts increase the child's chance of success in the initial phases of training, but the goal, of course, is to fade them as early in the teaching program as possible and allow as much of the sequence as possible to be voluntary.

For some children, it may be more efficient to teach more basic response repertoires prior to attempting feeding training. Imitation, for instance, can be developed by reinforcing a variety of responses which match those of the therapist (Peterson, 1968). Simple behaviors such as raising one hand, touching the head, clapping, etc., are used to teach the child to imitate and by definition the child will be able to copy other observed behaviors which directly relate to feeding. After imitation the child should learn to follow simple verbal directions. The verbal command rather than the imitative cue serves as the stimulus. That is once the child is imitating, the therapist can say "raise your hand"just prior to modeling this response. Gradually, the shifting of reinforcement only to responses to the verbal cue advances the child to a new capability. Once such simple skills are acquired the child may be more responsive to feeding training, since he is able to learn from mere observation or simple directions.

The essential feature of this teaching approach is restricting reinforcement to the behavior previously identified as the "target" or goal and avoiding "free" payoffs merely because the child looks sad or appeals to the therapist's altruistic motives. The development of the child's social competencies must always be considered of more importance than meeting the immediate social needs of the therapist. By constantly maintaining low levels of difficulty and assuring a high percentage of successful responses reinforcement training can serve the dual purpose of developing competencies and meeting the child's need for approval, affection and attention.

It is rarely necessary to comment on a child's poor performance, since he has been told overtly and covertly throughout his life that his performance is poor. By responding only to "good" responses training sessions can be maximally effective. Remember, if a child could have been talked into more adaptive behaviors, he would not require special help.

Implementing Programs in Feeding Training:

This paper certainly has not described all of the possible approaches to modifying feeding skills in children, but has hopefully pointed out that powerful techniques for modifying behavior do exist, that they have been extensively researched and that their application to feeding training deserves much more attention than has previously been the case.

Because of the high frequency with which feeding problems occur in the handicapped population, the development of a technology whereby such skills can be established on a widespread basis is of considerable importance from both a financial as well as a humanitarian standpoint. Although the necessity for individual help has been emphasized, practical manpower limitations often lead to continued "noncontingent" feeding practices and the use of liquid or semisolid diets. Additional techniques and approaches must be developed to allow a wider implementation of sound feeding programs. Recent research has suggested two major possibilities in extending the skills of the professional to meet the demand for services.

Sub-professionals:

Recent work (e.g., Guerney, 1969) has demonstrated the wide range of disciplines which have found volunteers to be effective in solving manpower problems. With training and supervision well-coordinated volunteer programs can provide high quality service to meet the immediate needs of a variety of handicapped children.

In addition, such persons be they college students, housewives, high school students or just interested persons in the community, serve as a link between the community and the handicapped child. They are also invaluable in mustering community support for meeting pressing problems. The ability to provide individual therapy and services to children who would not have the opportunity for help remains the primary value.

Hierarchical System of Patient Therapists:

A related approach to expand treatment programs to all who need them has been described by Ulrich, Louisell and Wolfe (1971). It involves "pyramiding" a teacher's skills downward such that the bulk of teaching is done by the students themselves. In actuality, what occurs is that college students teach high school students, high school students teach junior high students and junior high students teach elementary students. Although such applications to the handicapped population has not been found in the literature, there is reason to believe that higher level children can do an effective job of teaching lower level children and even within the same level children with a skill may serve as teachers or models for children who have not acquired that particular skill. Observation of children interacting in many different situations suggests that children like to teach other children and that they may actually prefer to be taught by other children. It would be challenging to implement this "pyramiding" concept into training programs aimed at developing self-help skills, for it would certainly demonstrate that handicapped children are capable not only of self-help but of helping each other.

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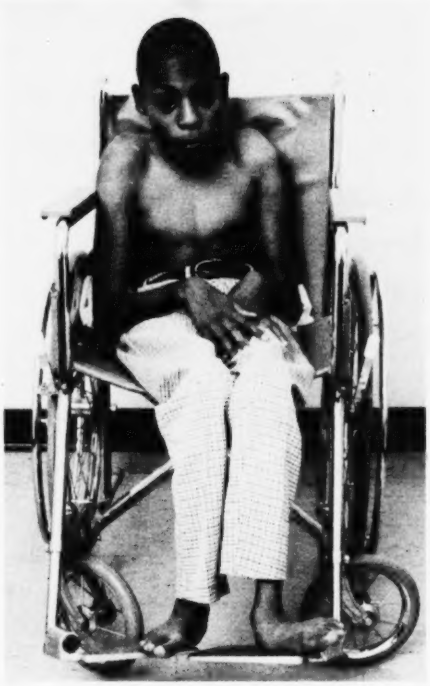
Mary Ann Harvey Smith, Ph.D. *

EVALUATION OF FEEDING PROBLEMS: A TEAM APPROACH**

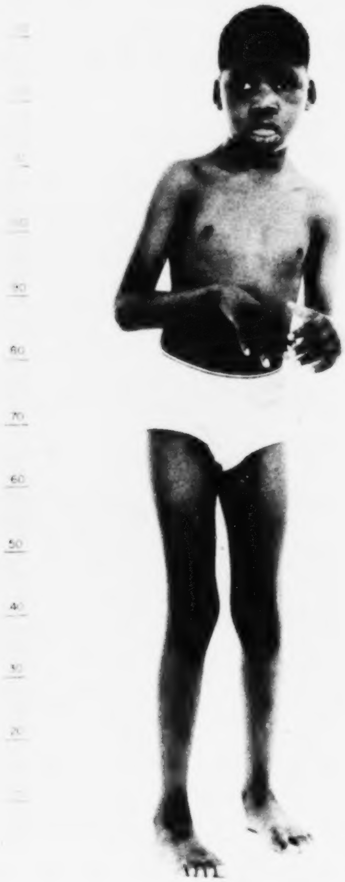
Introduction

Before a program of remediation for feeding problems is initiated, a complete evaluation of the child should be done. It is the belief of the staff from the Child Development Center that such an assessment should encompass the study of the child by many disciplines utilizing an interdisciplinary approach. This paper describes the interdisciplinary assessment of two boys with deviations in feeding. Each professional discipline evaluates each child and then reports their results to the team. Concensus diagnoses and recommendations evolve during a discussion of each case. In this report the evaluation of each discipline involved will be reported; then, the summary will include the concensus diagnoses and recommendations.

Case Study of Ricky and James



Ricky
Figure 1



James
Figure 2

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

Wayne Bland, ACSW[*]

THE SOCIAL WORK EVALUATION[**]

During the assessment of a child by the Child Development Center interdisciplinary team, the social worker contributes to the team an understanding of those societal forces that impinge on the child and the family. Many forces, social, psychological, physical, financial and cultural, work against certain individuals and their families and by identifying these forces, social work develops greater societal and individual awareness of the need for change.

The social worker is particularly concerned with the total family system. Its functional and dysfunctional aspects as well as how outside forces affect this system. The family's values, its socio-economic status, its decision making processes, its communication patterns and most important of all, its own unique feelings and perceptions as a family of individuals toward a child with a problem. These factors come into play when evaluating or assessing a family, and constitute the environment in which the child must live. Only if there is opportunity in this environment, can there be hope for the child in reaching his maximum potential.

When a family comes to the Center, it is often in crisis; uncertain about what to expect from its child, many times guilt ridden and unclear about what caused the problem. The crisis can be devastating to the family unit or it can be used as a rallying point for bringing together strengths for problems solving. The social worker helps in this problem solving by being an effective listener, supporter and interpreter to family members.

During the evaluation process, the social worker is often the "interface" team member. In other words, the team member that works with the family members sustaining and supporting them to insure that the process of evaluation is a constructive growth-producing process for the family.

In this paper, I am going to briefly summarize our assessment of two families: the family of Ricky and the family of James. I will attempt to compare and contrast the values, socio-economic status, child rearing practices, feelings and perception of these two families. I believe that our findings in each of these areas have a direct affect on these two children and on what the parents are able to do for them.

Ricky's family: Ricky is a 16 year old black male referred to the Child Development Center by the director of the United Cerebral Palsy Day Care Center for complete evaluation. He is confined almost totally to a wheelchair. He is a severely retarded sibling of three normal brothers: two older, one in college and one in vocational school; and one younger who is a ninth grader and who is described as being an average student. Ricky had an older sister who was hydrocephalic and who died at the age of 16 months. Behaviorally, Ricky is described by his parents as an easy child to manage and being quiet, easygoing and not too demanding. His relationship with his brothers was described as being very good.

Ricky's parents have been married for 23 years. Both are in their late 40's and both hold full-time jobs. The father has worked for the federal government for 23 years, and the mother is a licensed practical nurse at one of the city hospitals. The father works a 7-3 shift during the day and the mother works the 3-11 shift in the afternoon and evening. The father has responsibility for Ricky when he returns home. He prepares his food, gives him his baths, his exercises and generally entertains him. Both parents express a great deal of love for Ricky and have always followed professional advice in the caring for him.

These parents consider themselves middle class. They are buying their home; they are particularly striving people for their children, stressing educational and good citizenship values. In the past, they have worked well with helping systems such as the Child Development Center, and there is every indication that they will do so in this particular situation. Child rearing is consistent and firm and apparently a general feeling of good will pervades the household. At the time of our initial contact, the parents had two chief concerns: "What can we do to help Ricky become more independent and what will happen to him when we are too old to care for him."

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[**] **Presented at Nutrition Workshop, Child Development Center, January, 1971**

James' family: James is a ten year old, black male also severely retarded. He was referred to the Center for evaluation by the United Cerebral Palsy Day Care Center.

James is the oldest sibling of an eight year old sister and a two year old brother, both described as average. James has a half-sister, aged 23, who also lives in the home with her children.

Behaviorally, James was described as a destructive child, especially when angry. He will push other children and particularly tries to hurt his younger brother. James' father is in his 40's. He is a seasonal painter. The mother, in her 30's, is a part-time domestic. Care for James primarily falls on his mother, who is quite openly bewildered and sometimes overwhelmed by James.

The father is much less involved with James and only plays with him occasionally. The family system seems to be stable but the lack of understanding of James becomes a major family problem.

This appears to be a lower class family who is "barely making ends meet financially," and where both parents find some difficulty in coping with the demands on them. The child rearing practices are inconsistent, vascillating from being permissive to very controlling. This is due in part to the lack of understanding of James' behavior and to the parent's feelings of anger and resentment at having to cope with him.

The initial concerns of the parents were primarily centered around the need for residential care for James. The parents felt they could no longer handle him. We found out later, however, that because of the mother's feelings of frustration, we had misinterpreted many of the things that she had said. The family was very interested in James and wanted very much to care for him. However, it was believed that because of the lack of understanding of our organization and the past failures they had had with organizations such as ours, they were somewhat skeptical of us and possibly were afraid of what the evaluation would reveal.

Summary

Both families are black: One middle class, one lower class. Both have a child who is severely retarded with much physical involvement. Both children are totally dependent on their parents.

Ricky's parents, with many more personal resources at their disposal, have been and will continue to cope sucessfully with their problem. Their general attitude and emotional state is such that they are capable of maintaining their present situation as well as improving it.

James' parents are much more limited emotionally, culturally and financially. They will need help in understanding their problem and in coping with it. Although there are many frustrations and both parents are sometimes overwhelmed, they are interested in helping their son. They will probably maintain their situation as it is but they will need support and guidance when future crises arise.

Fay F. Russell, M.N.[*]

NURSING ASSESSMENT[**]

Introduction:

The professional nursing role in the interdisciplinary setting may vary from Center to Center; however, most agree that responsibility for ascertaining the facts of the child's environment, methods of child rearing or managing the child and the degree of independence he exhibits, rests with the nurse. A visit to the home is usually necessary if an accurate and complete assessment is to be made. At the University of Tennessee Child Development Center each patient is screened to determine the need for the nursing assessment. Those families who have problems in managing their child, the child who is below age expectation in self-help skills, the only child and/or the child who has health or handicapping problems are given priority for the nursing assessment. Both families below met the criteria and a brief resumè of the nursing assessment follows.

The A. Family

Located in a middle class black neighborhood, the modest two bedroom, one bath A. home blends inconspicuously with the other homes along the street. The exterior was neat, trim and appeared well-kept. The fenced back yard was neat and a German Shepherd dog was tied in front of the garage. The interior of the home was orderly and adequately furnished, but seemed a bit crowded for the four family members (Figure 1).

Ricky and his mother were at home at the time of the prearranged nursing visit. He sat in a chair in the living room, which also serves as the family room. Mrs. A. was back and forth from the kitchen as she was preparing dinner. Rapport was established quickly and easily with both mother and child. Ricky spoke in short sentences, often repeating what was said to him. He was heard to say several times, "Ricky wants." He followed only one very simple direction. Understanding of color or number concepts could not be elicited.

Mrs. A. gave examples of Ricky having an unusual memory. He repeated the nurse's name three times during the visit. He knows the title of several television programs, the title of several songs and identified the name of a singer whose recording was being heard. Mrs. A. related warmly to Ricky, smiling often and praising his small successes. He related to the nurse in ways expected of a two year old.

An attempt was made to assess self-help skills in the home. The Washington Functional Screening Test was utilized to show level of functioning in several areas. In most areas performance is appraised at the 13-18 month level and the 1½ - 2½ year level. See Figure 2.

Ricky is non-ambulatory and is clumsy and awkward in all gross and fine motor activities. He has a sturdy walking chair that can be used both indoors and outdoors. He is able to feed himself finger foods and to lift a spoon or fork to his mouth after it is loaded. He was observed to drink from a mug, holding it unsteadily with his right hand. Ricky sits at the table with his family at mealtime. His chair is padded to promote comfort while eating; however, his lower extremities are not supported.

Although Ricky shares a bedroom with his brother, each has his own twin bed. His father assists with his nightly bath and puts him to bed around 9:30 p.m. He is said to sleep well all night and arises about 6:30 a.m.

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

Toilet trained since he was two years old, Ricky never wets or soils. He indicates the need to eliminate and can get to the bathroom alone if he is in his walker. He has to placed on the commode in a horizontal position to void--he supports himself on the tub. Since he is bothered with constipation he is given a laxative (Castoria)* twice weekly.

Discipline does not appear to be a problem. Both parents assume responsibility and seem consistent in management. Some responsibility for Ricky's care is delegated to a 14 year old sibling--particularly when the two are outside. The family seem to enjoy Ricky and Mrs. A. thinks he is happy.

Ricky seems to enjoy music and many recordings are provided. He watches television shows such as "I Love Lucy." He thumbs through books and magazines and sometimes he recognizes some articles that he has seen advertised.

When Ricky was four years old he made his only trip to the zoo. He has not been to the supermarket or movies in several years. The family never takes overnight trips. Ricky especially enjoys rides in the family car and is taken for a drive three or four times weekly. He attends a day care center one-half day, five days per week.

Mysoline 250 mg. ½ tablet is given to Ricky four times daily for effective seizure control. Unicaps,* 1 tablet, is given daily for vitamin and mineral supplementation. Castoria,* a laxative, is given as needed. The medications are kept in a safe place and are administered by Mrs. A. as directed.

Mrs. A.'s concerns about Ricky center around his future--what will happen to him when they are gone. Presently the problem of his physical management looms large because the mother has recurrent backache and has had a hysterectomy recently. The lifting required in caring for Ricky is described as the chief problem. She is also concerned about the manner in which others treat Ricky and gave examples of pointing, staring, etc. Presently child care arrangements are satisfactory and she continues her job.

Recommendations could hopefully include some additional means of locomotion for Ricky; a wheel chair may be helpful. Consideration might be given to including the 14 year old sibling in the informing process, since he is closely involved in Ricky's care. Continuation in the day care center is indicated and eventual residential placement should be considered.

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* Patented trade name

The H. Family

Just off a busy thoroughfare, on a tiny street without benefit of gutters or sidewalks, stand rows of "shotgun" type houses whose shabbiness and neglect reflect the poverty of the families who inhabit the houses. About midway down this street the H. family of five resides. Unkept, bare, run-down, perhaps best describe the neighborhood and the H. dwelling. The small front yard was littered, however, the backyard was a little larger and did offer some space for children to play. Awareness of the need for cleanliness, paint and repairs on the outside is dimmed as the drab interior and its shabby furnishings are seen. In spite of the shabbiness and dearth of furniture, some effort had been made to "straighten up" the front room and the mother said that she would rather not show the nurse the remaining part of the residence (Figure 3).

Despite several appointments to see both Mrs. H. and James at home, they were all broken with good reason--Mrs. H. had to work. A time was set up to see Mrs. H. at home and to see James at the day care center where he attends half day sessions, five days per week.

When Mrs. H. was describing James, who has been severely retarded and physically handicapped all his life, it was noticed that she never smiled. She spoke in rather matter-of-fact tones of the many problems and the burden of caring for James, in addition to the two younger children, whom she feels are neglected because James requires so much care.

Functional skills were assessed utilizing the Washington Functional Screening Test. In most areas of performance is appraised at 9-12 month or 13-18 month level. See Figure 4.

James has very poor gross and fine motor control. He walks unsteadily and when standing, if he is touched he falls. He is unable to get up and down steps without assistance. He handles small toys and utensils awkwardly. The H. family sit as a group for the evening meal and Mrs. H. says there is little conversation at mealtime. James feeds himself such foods as crackers, sandwiches (when cut into four parts) and cookies. Other foods are fed to him, usually by his mother. He is described as messy at mealtime. James' speech is very immature and only a few words are understood. Mrs. H. indicated that he uses a few two-word phrases at times. He gestures or points to make his needs known.

Noisy toys and music are James' favorites. He seems to enjoy books and magazines, but soon destroys them. He has been to the zoo several times and goes to the supermarket weekly with his family. He stands and looks out the door or window for long periods at a time. James has never attended Sunday School, the circus, the movies or been on a trip outside the city.

Discipline is a major problem according to Mrs. H. "James is hardheaded and is hard to make mind. Spankings make him worse. He is getting worse--getting harder to manage and is making me nervous." She has found that physically moving James rather than continually asking him is more effective and that keeping calm is better than getting upset. His tantrums, his screaming and such actions as turning on the stove are things that bother his mother. The father does not always support her in ways of managing James.

James is able to let his mother know of his needs for elimination; he is taken to the bathroom and eliminates appropriately. He is unable to care for himself in any way with this function except to flush the commode. He is able to take the right foot to push the left shoe off and vice versa. He extends his left arm to put on his coat and indicates the need for his cap. All other undressing and dressing is done for him; oral hygiene is very difficult, but is done using small squares with tooth paste and a cloth to wipe. He enjoys his bath; however, someone has to be with him.

Application has been made for residential placement. Uninvolvement of the father, and to some extent the mother and the many problems of this severely retarded multiply handicapped child seems to make residential care more urgent in this instance. Supportive counselling and guidance in helping toward more effective ways of behavior management is needed.

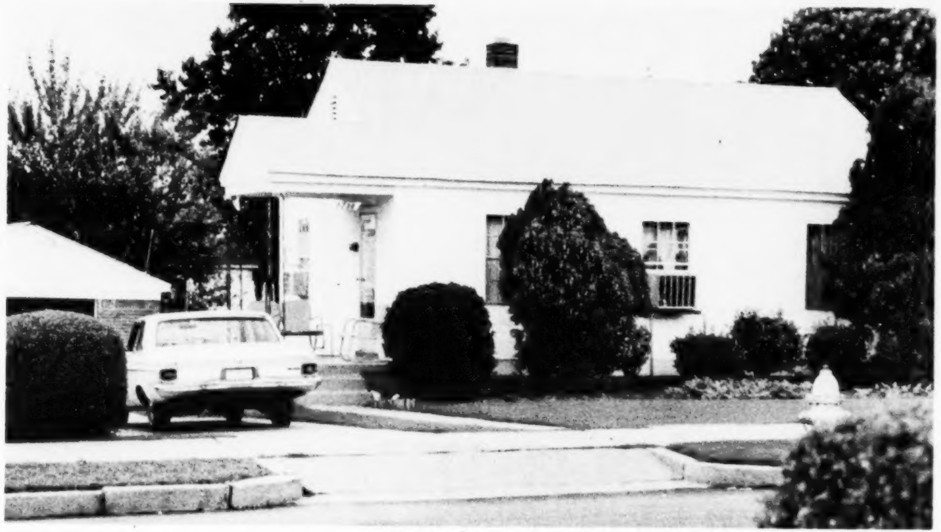

Figure 1
Ricky's House

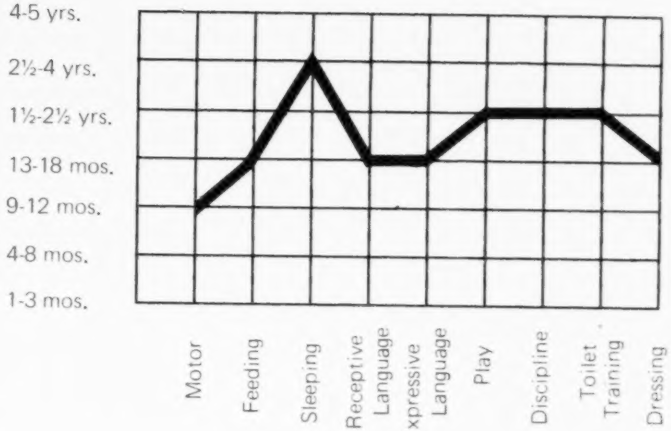

Figure 2
Ricky's Chart

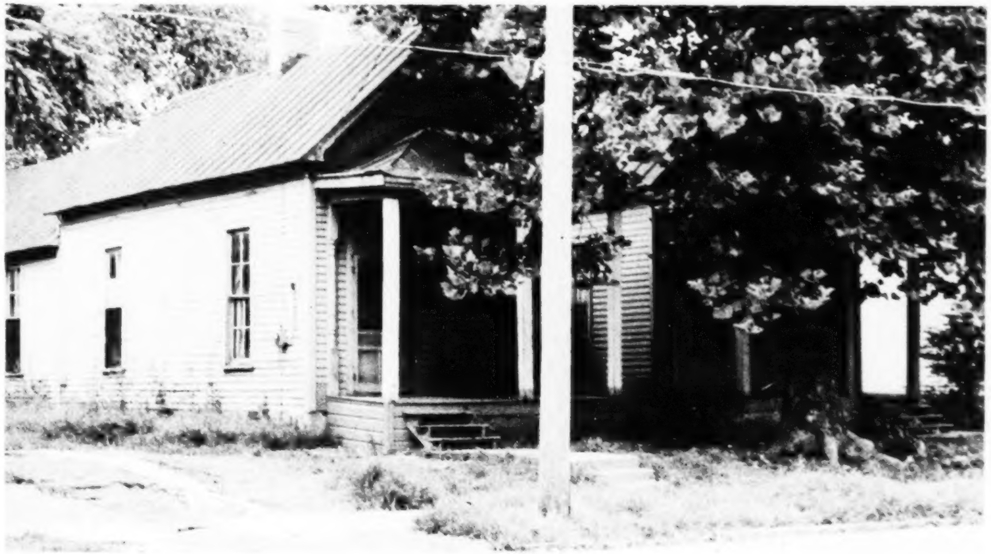

Figure 3
James' House

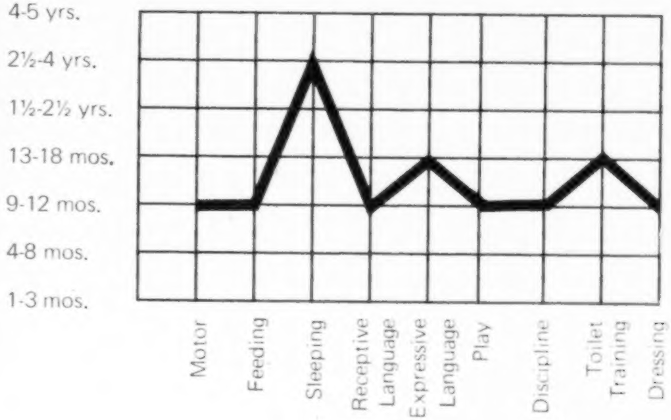

Figure 4
James' Chart

Bob Freeman, M.A.[*]

PSYCHOLOGY EVALUATION[**]

Psychological evaluations of children at the Child Development Center involve both formal and informal assessment procedures in the following areas.

1. The overall assessment of intellectual skills in terms of actual developmental stage (mental age) and overall potential (IQ).
2. The identification of specific strength and deficiencies in the child's behavior repertoire such as basic academic skills, perceptual skills, motivation and emotional factors.

Assessment in some of these areas is often difficult, but in the handicapped child serious motor impairments or other factors make it essential that we "get around" such problems through the use of tests presented in different modalities with a variety of response options. Also, many retarded children score below the minimal levels measured on the major psychological tests and require the use of estimates or ranges rather than precise scores (e.g., IQ below 30). These estimates may of course be quite valid, but do point out the problem of making fine behavioral measurements on low functioning children. It would not be unusual for two children with similar mental ages and IQs to respond quite differently to feeding training and to necessitate quite different approaches and different amounts of training. Psychological tests will not tell us where to start in teaching feeding skills with a child, but may be of considerable value in planning programs which will capitalize on the child's strengths and minimize his weaknesses. In any case, the relatively brief period required to obtain psychological data is usually time well spent and will only be a fraction of that required for modification of self-help skills.

Psychological Evaluations

Ricky

Reason for Evaluation: Ricky was referred for evaluation in order to obtain a measure of his intellectual ability.

Prior Testing: None reported.

Test Results:

Stanford-Binet Intelligence Scale, Form LM:
    Mental Age: 2 - 8
    IQ: below 30
Peabody Picture Vocabulary Test, Form B:
    Mental Age: 3 - 8
    IQ: 26
Goodenough Draw a Man Test:
    Mental Age: below 3 - 0
Informal Geometric Drawings:
    Estimated Mental Age: below 3 - 0

Intellectual Level: Severe Mental Retardation (AAMD)

Behavioral Observations:

Ricky is a sixteen year old Negro boy who readily entered the testing session and did not exhibit any apprehension. He has been diagnosed as having Cerebral Palsy which resulted in a great deal of motor involvement. Ricky does not have use of his legs and only limited use of the upper extremities. He related well to the examiner and tended to engage in a lot of loud boisterous verbal interaction. Articulation problems were noted, but his speech was not overly difficult to understand. Ricky was echolalic and the examiner was surprised at his ability to name a fairly large number of objects. He was able to count to ten, but when asked to count the examiner's fingers, it became obvious that this ability was more rote than rational. Ricky exhibited a preference for his right hand, and there did not appear to be any gross problems in the areas of vision and hearing.

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[*] Psychology Intern, Child Development Center, University of Tennessee Medical Units, Memphis, Tennessee

[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

Test Interpretation:

Ricky was able to complete all of the tasks at the two year level on the Stanford-Binet Intelligence Scale, but was unable to successfully perform any of the items at the four year, six month level. His earliest failure occurred on identifying objects by use; whereas, his highest levels of success involved items which required descriptive skills. Ricky's performance earned him a mental age of 2 years, 8 months, and an IQ below 30. This would place him in the severely retarded category. The other intellectual measures tend to support such a placement. For example, on the PPVT he earned a mental age of 3 years, 8 months, and an IQ of 26. His drawing of a man was not recognizable and he was unable to reproduce the circle on the Informal Geometric Designs Test. Both of these performances are indicative of a mental age below three years. Ricky's mother was not available on this date, so an indication of his social and self-help skills could not be obtained.

Summary Impressions:

Ricky is a sixteen year old Negro boy who is presently functioning at the severely retarded level. Cerebral Palsy has left him with motor handicaps which prevent him from making full use of his abilities. He exhibits the over-responsiveness which is characteristic of some children who have experienced neurological impairment. Ricky also exhibits echolalic speech and his language skills appear to be in line with his level of intellectual ability. He is able to name a large number of objects and has skills such as counting, which might give the impression of a higher level of intelligence; however, they appear to be of a rote nature and are therefore misleading.

James

Reason for Evaluation: James was referred for psychological evaluation in order to obtain an indication of his intellectual level and to assess the feasibility of a training program.

Prior Testing: None reported.

Test Results:

Stanford-Binet Intelligence Scale, Form LM:
  Mental Age: below 2 years
  IQ: below 30
Peabody Picture Vocabulary Test:
  Mental Age: below 1 - 9
Goodenough Draw a Man Test:
  Mental Age: below 3 - 0
Vineland Social Maturity Scale:
  Social Age: 1.94
  Social Quotient:. 19

Estimated Level of Intellectual Functioning: Profound (AAMD)

Behavioral Observations:

James was a ten year old Negro boy who did not want to separate from his mother; but, when the examiner took him firmly by the hand, he followed without too much difficulty. James stayed seated at the table and was not overly active, but at times was distracted by the observation mirror. His fine and gross motor coordination was poor and his speech was difficult to understand. James did repeat the names of a number of objects, but no word combinations were noted. Gross problems in the areas of vision and hearing were not evident.

Test Interpretation:

James was unable to successfully complete all of the subtests at any age level of the Stanford-Binet Intelligence Scale, Form LM. In fact, his only success was in naming parts of the body at the two year level. Even here his performance was questionable. In general, his performance on the Binet indicates a MA below two years and an IQ below thirty. A performance of this magnitude places him at the profoundly retarded level. James' drawing of a man was unrecognizable and indicates a MA below three years. On the PPVT, he was unable to establish a basal age and obtained a raw score of only four. A raw score of this size reflects a mental age below one year, nine months. He achieved a social age of 1-11 and a social quotient of 19 on the VSMS. All of these performances are consistent with a profoundly retarded level of functioning.

Summary Impressions

James is a ten year old Negro boy who is presently functioning at a profoundly retarded level. He experiences difficulty in both fine and gross motor coordiantion and this prevents him from accomplishing some tasks within his capabilities. Speech and language development appear to be retarded; but are probably in line with his overall level of functioning. He is capable of exhibiting negative behavior, but appears to respond favorably to firmness.

Jeanette C. Deese, M.Ed.*

EDUCATIONAL EVALUATION OF TWO RETARDED BOYS, JAMES AND RICKY**

Because education is essentially a profession of shaping or modifying behavior, evaluation must include examination of behavior in its broadest sense, with emphasis upon the interrelated aspects of thinking, feeling and overt actions. Generally speaking, educational evaluation consists of four steps: (1) assessing potential ability; (2) assessing level of current functioning; (3) defining goals; (4) planning appropriate programs to achieve the desired objectives.

Results of testing by the psychologist indicate that Ricky's intellectual ability falls within the range of severe retardation, and James is profoundly retarded. At these levels of retardation, neither Ricky nor James would be expected to master functional academic skills. A mental age of four to six years is usually considered to be the cognitive stage at which readiness skills for formal learning are best introduced, and neither Ricky nor James has attained this level of development yet.

Ricky can verbalize in a limited fashion. He can give his name and age, and he seems to understand oral directions. On an informal reading inventory, he recognized a few sight words at the pre-primer level...words such as "mother," "father," "Mary," "doll," "house " and pretty. Although he recognized these words in a contextual setting and there were no pictures, he was unable to respond to questions which would indicate that he had comprehension. He was, in fact, echolalic in response to most of the questions. Since Ricky seems to have some ability for visual and rote memory, he may eventually be able to attain a "crucial" vocabulary, which includes such words as danger, exit, poison, stop, go; but learning the concepts behind these words will probably come much later in his development.

When shown a picture card for the Engelmann ***Basic Concept Inventory,*** James did not respond to questions of simple basic concepts such as "Point to the dog" or "Where is the man?" He seemed to attempt to say the word "dog." He did not appear to comprehend verbally-given instructions.

Goals for Ricky and James must be realistic. Both boys should be able to profit from training in self-help skills, communications abilities, coordination and body building. Perhaps Ricky may be able to learn to deal with size, form and shape, and such concepts as large and small, up and down; but it will be necessary to work around his gross motor problems.

Indications are that as an adult, James will continue to need complete care and supervision. It is possible that Ricky may be able to develop self-help skills to a minimal useful level in a controlled environment. If it were not for his neuromotor problems, he might be able to progress to the point where he could partially contribute to self-support under complete supervision.

In working with these boys towards desired goals, evaluation should be on-going, with their programs adjusted as their needs change. Each phased task should be small enough that a modicum of learning will show up as progress. Yet all the learning tasks should have sequence and direction and not be taught in isolation. Although Ricky and James are severely retarded and handicapped, they may be expected to make gradual progress under a carefully structured training program.

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**Presented at Nutrition Workshop, Child Development Center, January, 1971

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G. J. Billmeier, Jr. M. D.*

PEDIATRIC EVALUATION**

Case One

Ricky was seen by the Child Development Center Pediatric staff at age 16 years with a history of cerebral palsy and developmental retardation. An associated convulsive disorder was apparently well controlled by medication.

The child's prenatal history revealed him to be the product of his mother's fourth pregnancy. The mother received prenatal care and was said to be anemic for which iron shots were given. There was no history of maternal malnutrition, trauma, exposure to toxins nor febrile illness throughout gestation. Pregnancy ended prematurely at 6½ months gestation after spontaneous onset of labor and delivery of a male infant weighing 3 pounds, 7 ounces. Resuscitation of the infant was required in the delivery room and he received oxygen for an unknown period of time.

Ricky remained in the newborn nursery for two months at whch time he was discharged to his mother's care. She noted activity to be very sluggish and he began having frequent episodes of nocturnal fevers, the origin of which was not determined. Generalized seizures began at age 6 months and occurred frequently for several months until controlled by anticonvulsant medication.

Ricky was bottle fed on evaporated milk formula until weaning at age 8 to 9 months. Solid foods were introduced at four months of age but the child never seemed able to chew properly and remained on soft, mashed table foods. Weight gain was extremely slow in comparison to three older siblings.

Developmental milestones were uniformly delayed, never attaining the ability to walk or even sit unsupported. At 16 years of age, Ricky was confined to his wheelchair during waking hours and carried about by his parents. Language was limited to simple phrases. He attempted to feed himself but spilled considerably.

Current medications included Mysoline for seizure control and a multi-vitamin supplement.

Family history included mother and father who were both 47 years of age and said to be in good health. An olde female sibling died at age 16 months due to complications of hydrocephalus. Three male siblings, ages 21, 18 and 14 years were alive and well. There was no other history of mental retardation, birth defect or neurologic disorder in the immediate family.

Physical examination revealed a black male child confined to a wheelchair who appeared quite small for his chronologic age. His weight of 67 pounds fell much below the norm for his age and his linear growth was proportionately stunted. A head circumference of 52 cm. was consistent with general growth retardation. Nutritional status appeared fair although muscle mass was generally diminished. Drooling occurred occasionally and language was considerably echolalic and meaningless except for asking to use the bathroom. Additional significant findings in the physical exam included flexion contractures of the elbows, shoulders, hips and knees with generally spastic and atrophic musculature in all extremities. Deep tendon reflexes were generally hyperactive and fine motor incoordination was evident.

Laboratory studies included a hematocrit of 39% and a urinalysis negative for protein, glucose and ferric chloride reaction.

It was the impression of the pediatric examiner that Ricky demonstrated a neuromotor disorder, severe mental retardation and significant growth retardation. A subsequent pediatric-neurology consultation concurred with these findings.

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**Presented at Nutrition Workshop, Child Development Center, January, 1971

Case Two

James was also referred to the Child Development Center with the diagnosis of cerebral palsy manifested by severe physical handicaps and mental retardation. He was 10 years, 3 months at the time of the pediatric examination.

The prenatal history revealed the boy to be the second child of a 27 year old mother who had an uncomplicated term gestation. Labor was spontaneous in onset but lasted 15 hours resulting in delivery of a 6 pound male infant. The infant had delayed cry and respiration requiring resuscitation. During the first week of life, the baby slept nearly continuously and had numerous eye-rolling spells while awake. Major seizures appearing at 18 months of age have been fairly well controlled on medication with approximately one seizure episode yearly since then.

Developmental history included sitting alone at 11 months, walking at 3 years, and delayed acquisition of speech and language. At the time of the pediatric examination, James could not dress himself, fed himself awkwardly with hand-held foods and was not capable of independent toilet care.

Family history included a 47 year old father and a 38 year old mother both living and well. An older sister, age 23 years, and two younger siblings, a girl, age 8 years, and a boy, age 2 years, were also in reported good health.

The physical examination revealed a black male child with obvious microcephaly and short stature for his chronologic age. A height of 52 inches and a weight of 59½ pounds were both greater than one standard deviation below the norm for age. The boy appeared severely retarded exhibiting no meaningful language but only frightened cries. Additional significant physical findings were a large protruding tongue, frequent drooling and dental caries. The neurologic examination revealed spastic quadriparesis and hyperreflexia. The boy was ambulatory but clumsy. Flexion contractures were found about the elbows although wrist and hand function appeared fair with an immature grasp.

Laboratory studies included a hematocrit of 43% and an urinalysis negative for protein glucose and ferric chloride reaction.

The pediatric examiner felt this boy presented a picture of severe mental retardation with microcephaly, impairment of neuromotor function and an associated convulsive disorder.

Robert P. Christopher, M.D.[*]

PHYSICAL MEDICINE EVALUATION[**]

I would like to talk about Ricky first. When we examined him, he was very cooperative. He talked quite a bit during the entire examination but responded well to directions and this is one of the first things I look for in evaluating the potential for feeding training. I am referring to whether a child can follow simple commands. The first point that I am interested in is whether he has sufficient range of motion. We evaluate the range of motion bilaterally. His arms do not extend out to 180 degrees which would be normal. There is considerable resistance. This muscle will tighten as soon as you pull on it which indicates spasticity. He is now pulling back voluntary. The muscle responds to stretch and they over respond which is rather difficult. In addition, his arm shows good range in abduction but some limitation of range in forward flexion which is not really a limitation to feeding.

The next problem I am interested in is the problem of supination. I can tell you from experience that when a child has an elbow flexion contracture you usually find limitation of supination also because the head of the radius ties into the elbow joint. In fact, with the limitation of extension, the radial head cannot rotate well. I could not turn his hand over. I could turn it over a little but he could not turn it all the way over. When he relaxed, I could flex his arm further. In regard to his finger function, he did this right away. There is no delay; he immediately squeezes with poor strength but I would say sufficient to be able to hold a spoon on this side. His findings are essentially the same on both sides.

Now with regard to strength, there is muscle activity throughout his arm. Both his arms and his legs are smaller than would normally be expected of a body this size. However, for the particular function we are evaluating which would be that of feeding, the amount of strength required is within range of what he has. I think he has sufficient strength for feeding but probably not for other things. Dr. Billmeier is demonstrating the fact that he has considerable atrophy around the shoulders. You can see that he is not well-muscled at all.

In general, regarding his feeding potential, we can say that had he been started on a feeding-training program at the age of two or three, he probably would be feeding himself now. This does not mean that the game is lost simply because he is 16. I was very interested in the comments with regard to the family situation because often this influences greatly our ability to be successful in a program like this. I feel that Ricky's potential for feeding is fairly good in light of his very supportive family situation and the fact that there would probably be a good follow-through at home on the techniques that would be demonstrated to the mother and father here.

Prior to the actual initiation of the feeding program, one would have to reduce the flexion contractures or it would be difficult for him to position his arm well. Also there is some resistance to motion at the wrist. We could either through the use of physical and occupational therapy or medicines or both reduce some of this spasticity and hypertonicity. We could then begin a feeding program which would take several months. I think over a period of time beginning gradually at first with gross activity and slowly adding fine coordinated motor activities, we could eventually train him to feed himself with a spoon. I am speaking of a training period of 9 months to possibly as long as 18 months. Since the time is short, I do not want to go through a complete neurological examination but suffice to say that his reflexes are hyperactive in comparison to a child that is not spastic. They tend to be more brisk than you would normally find them. It does not take much of an effort to produce a response. You can feel it better than you can see it but take my word for it, it is hyperactive.

Now with regard to James, he also has flexion contractions. James was not found to be quite so cooperative in the examining room. He did not cry or resist us; he did not pay much attention to the directions. We asked him to open his fingers and squeeze. He was much more interested in looking at the floor. We also found that he has flexion contractions. He has about a 35 degree flexion contraction at his elbows which is not unusual for children sitting in a wheelchair. They are sitting with their arms flexed all day long. They are very tight in this position and the same thing is true with the knees. He seems to have fair hand function and he can pinch with his fingers. He seems to be able to get his hands to his mouth but he did not show a lot of interest in doing so.

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

I noticed the other day that Dr. Billmeier tried to hand him something and he would not take it from him. Most severely retarded children will accept an object especially if it is a bright object. I always try to hand them my flashlight and I have not seen many children who were not interested in it. He would not take that from us, and I do not think it was that he did not have the ability. I think he was frightened of the whole situation. He also has tightness in the shoulders.

His finger and wrist function is fairly good except that when he reaches for an object he shows a marked intention tremor which is usually a sign of cerebeller problems. It is a coarse tremor, and he had a great deal of difficulty achieving any grasp with it. He does not do as well with his right hand as his left. He shows better function on the left, and I think that is the one we could work with on feeding.

With regard to his mouth function, it seems to be good. He does not drool and is able to hold objects in his mouth.

Regarding James' potential, I think that he may be able to be taught to feed himself although I am not as optimistic about James as I am about Ricky. This is because of his inability to use both hands although it is possible with the same therapist working with him over a period of time, he might do better.

There are a number of factors which can influence potential for feeding. I think possibly with a long period of very supportive therapy, both boys might be taught to feed themselves. It is not feasible to try to teach feeding skills on an out-patient basis unless one has a good supportive family. I really feel that a controlled environmental situation such as they have in a hospital, or school for the retarded, would be the only type of situation that would offer the opportunity to really achieve successes in feeding training for children like James. I think he might make some gains in a day care center. They have a large number of children; thus, they cannot spend several hours a day with each boy which is what he needs. Where as in an institutional setting, he can spend several hours a day in physical and occupational therapy and an attendant would be working with him in addition. We would not spend eight hours a day just feeding. This would be a total education situation and even if James had a better family situation, I still would not recommend that he be tried in that situation because a combination of his spasticity and low mental level means that it will take a more concentrated effort to really achieve very much in developing feeding skills.

Cathleen Zinkus, O.T.R.[*]

OCCUPATIONAL THERAPY[**]

During the evaluation, the children received an occupational therapy assessment and were placed on a trial therapy program for ten minutes each day. This program was carried out by an aide in the Day Training Center under the guidance of an occupational therapist.

Case One

Ricky has been engaged in an occupational therapy program in the Day Training Center at the Child Development Center for six weeks. His program includes activities to improve blowing, sucking, lip closure and tongue control. He has received directional training in the area of grasp and release to improve his feeding skills. During the activities for directional training, desired feeding motions are duplicated.

Ricky's wheelchair has been equipped with a lapboard which helps to support him. He has also been given a footrest since his feet needed support and did not touch the floor. The chair Ricky has now is too large for him; thus, these modifications were made only as a temporary measure. It is recommended that he have a new chair made especially for him as soon as possible.

Ricky now needs a swivel spoon since he usually spills food before it reaches his mouth. This is due to limited supination. He has been encouraged to drink through a straw so as to improve lip closure, sucking, etc. Other activities done daily include circular and back and forth motions since they are important motions for hand to mouth coordination.

Case Two

One of James' greatest problems was poor head control. To improve this, it is recommended that his chair be equipped with a headrest or some kind of helmet which would provide support. In addition, many directional activities can help improve head control as well as other feeding motions. He also needs a footrest which will support his feet in a functional position.

James has received therapy daily in the Day Training Center for the past six weeks. In addition to the activities mentioned above, he has received training in sucking, chewing, tongue control and lip closure. He is still unable to straw-drink and will need much more pre-straw activity. When he becomes more proficient in controlling his tongue and lips, he will be introduced to a swivel spoon.

The treatment process for these children will require much time and patience. Much more could have been achieved had the therapy program been initiated when these children were 2 or 3 years old. Yet, some improvement has been made during this initial six weeks of trial; thus, there is hope. It is recommended that this program be continued following the evaluation.

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

Mary Ann Harvey Smith, Ph.D. [*]

NUTRITION ASSESSMENT OF RICKY[**]

Ricky's nutritional assessment included evaluation of his pre-, peri- and post-natal feeding history. The prenatal assessment includes the history of the mother's food habits and eating practices prior to and during pregnancy, her weight gain and the problems encountered with nutritional implications, e.g., toxemia. The peri-natal history includes information regarding formula prescriptions, food tolerances and mechanical and physical problems encountered in the first weeks of life. The post-natal history surveys eating practices and food habits from infancy to the present. Criteria used in this later assessment include height of the child in relation to weight, hematocrit and hemoglobin levels, food intake evaluation through calculation of intake records and consumption frequency measures, as well as gross evaluation of feeding skills and mechanical feeding problems through observation of the child with food. A nutrition evaluation form has been developed for the assessment of the areas.

In the case of Ricky, the nutrition assessment revealed that the mother received regular care throughout pregnancy. She gained about 12 pounds gradually with the pregnancy which ended at 6½ months. Her food habits during pregnancy were the same as prior to pregnancy; she did not watch her weight and a restrictive diet was not consumed. She took a vitamin supplement as well as iron and calcium throughout pregnancy.

Ricky was delivered prematurely at 6½ months gestation with a birth weight of 3 pounds and remained in the hospital for the first two months of life. He had no difficulties with mechanics of sucking and swallowing or digestion of food in the neonatal period. The early formula consisted of evaporated milk and water, normal dilution, plus corn syrup. He was weaned at the age of 9 months. During infancy, Ricky was fed on demand.

Ricky's parents realized that he had mechanical feeding problems when they tried to introduce solid foods at 4 months of age. This child had difficulties in propelling food to the back of his tongue for swallowing and in mastication. The parents were persistent in their efforts of feeding, and Ricky was introduced to table foods successfully by one year.

The child's growth was delayed after the first month of life. The parents were quite concerned about his growth rate; however, growth records were not kept. Presently, at age 16, Ricky's weight is that of a "normal" 9-10 year old male.

The current nutrition picture for Ricky is one of a growth retarded boy with a hematocrit of 39%, a good appetite, delayed feeding skills and pronounced mechanical feeding problems. He receives a vitamin supplement containing iron daily, has regular dental checkups and no dental caries. Because of non-ambulation and a dislike of most fruits and vegetables, Ricky has chronic constipation which is treated with a patented laxative twice a week. Ricky takes medication for control of his convulsive disorder four times daily.

This family has a daily routine and feeding schedule. Ricky has become quite rigid in his food pattern and eats the same foods at the same time every day. (See Table 1). His food likes are unusual in that he prefers the salty taste to the sweet taste. Thus, he always eats cereal with salt rather than sugar. The significance of the unusual craving for salt is neither known nor understood.

Table 1 Basic Food Pattern

Breakfast	Lunch	Supper	Bedtime Snack
9:00	12:30	6:00	8:00
Cereal with milk and salt	Meat	Meat	Cereal with milk and salt
Bacon	Bread	Starchy vegetables	
Bread	Milk		
Milk			

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

His other food preferences include bread, dry spaghetti and macaroni, cereal, chicken, pork chops, apples and milk. Ricky dislikes cheese, most green and yellow vegetables, beef, oranges and sweets. Calculation of food intake records kept by Ricky's mother for two days revealed that he consumes a diet deficient in calories (less than 50% of National Research Council's Recommended Dietary Allowances). With the vitamin-mineral supplement, his diet appears adequate in protein and all vitamins and minerals.

In summary, Ricky, a 16 year old black male, has physical handicaps which cause mechanical feeding problems. His feeding skills are delayed and he has difficulty chewing some coarse and fibrous foods.

The child prefers salty foods, refuses most vegetables and fruits, and does not consume as many calories as are recommended. He has chronic constipation possibly associated with the lack of fiber containing foods in his diet. Calculation of two day food records revealed an adequate intake of all nutrients with the vitamin-mineral supplement.

Nutrition recommendations include therapy for feeding skill development and counseling with the family in the introduction of more fruits and vegetables into the diet.

Elizabeth Brannon, M.S., R.D.[*]

NUTRITION ASSESSMENT OF JAMES[**]

In evaluating the adequacy of a diet, one of the things the nutritionist notices is the child's size. The Iowa Growth Chart is used for plotting height in relation to age and weight in relation to height. James' height is one standard deviation below the mean for his age. His weight is near the mean for his height. James' parents are of average size. Another indicator of nutritional status is hematocrit. James' hematocrit was 43% which is quite good.

James was reported to have no digestive problems. He did have a constipation problem from one to three years of age, but when he began walking, this exercise improved his elimination. James has an intolerance to tomato sauce but no other foods produce an allergic reaction. When table foods were introduced, James had difficulty with swallowing but this is no longer a problem. He does, however, continue to have a problem with biting and chewing.

James sits at the table with his family at mealtime. His mother gives him a spoon which he holds in his left hand. He is able to get little food to his mouth with a spoon although he can eat with his fingers. His mother, therefore, feeds him most of the meal with a spoon. It usually takes 20 minutes to an hour for James to eat a meal. James continues to take milk from a baby bottle. His mother feels he would not get sufficient nourishment if she took the bottle away from him.

James' mother described his appetite as good. He likes all foods served him. His preferences include cooked cereals, pancakes, eggs, bacon, fruit, juice, milk, sandwiches, meat and vegetables. Despite his chewing difficulty, he is given raw vegetables such as carrots, cabbage and lettuce shredded finely. His mother says he holds a cracker or bottle constantly.

James' mother kept a record of the foods he consumed for three days and the nutrient content was calculated using ***Food Values of Portions Commonly Used,*** Eleventh Edition, by Bowes and Church. His diet during these three days was adequate in all nutrients when compared with the National Research Council's Recommended Dietary Allowances. He has been given no vitamin supplement since infancy. His diet was below recommendation in calories. Since James' weight is about average and since his energy expenditure is low due to his limited activity, this caloric intake is felt to be adequate.

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[**] Presented at Nutrition Workshop, Child Development Center, January, 1971

SUMMARY

Case One - Ricky

The team reached the following consensus opinion regarding diagnoses and recommendations for this child. These findings are outlined below:

Intellectual Level:	Severe retardation
Clinical Manifestations and Pertinent Findings:	Neuromotor disorder Incoordination Spastic quadriparesis Non-ambulatory Hearing loss - moderate Mechanical feeding problems Convulsive disorder Grand mal seizures controlled by medication
Etiological or High Risk Factors:	Prenatal: Prematurity - 6½ months gestation Perinatal: Low birth weight - 3½ pounds, asphyxia Postnatal: Status Epilepticus
Recommendations:	Follow-up by occupational therapy Follow-up by otolaryngology Continue activity therapy for feeding-training in Day Training Center Consider eventual residential placement Continue medication for seizure control

The parents were informed of the results of the evaluation on their son and were very accepting of the diagnosis--severe mental retardation. They were not ready to consider residential placement but were aware that such would be the ultimate place for Ricky.

Both parents were pleased with the results of activity training Ricky had received in the Day Training Center during the evaluation and were quite willing to participate in the program with carryover at home. The occupational therapist was invited into the home to instruct the parents and other family members in the mechanics of the program.

Resources for the badly needed wheelchair were discussed. It was suggested that the family seek assistance from Crippled Children's Services as soon as possible.

The occupational therapist has planned an on-going therapy program for Ricky. Since the team believes that Ricky does have potential for self-feeding and may be able to improve in the mechanics of eating, both the child, his family and the aides in the Day Training Center are actively involved in the teaching-learning process.

Case Two - James

The consensus findings and recommendations for this child are outlined below:

Intellectual Level:	Profound retardation
Clinical Manifestations and Pertinent Findings:	Neuromotor disorder Incoordination Spastic quadriparesis Microcephaly, secondary Convulsive disorder Major motor seizures Growth retardation Deficient dietary calorie intake

Case Two - James (Continued)

	Mechanical feeding problems biting and chewing Unusual cultural - familial influence uninvolvement of parents
Etiological or High Risk Factors:	Perinatal: asphyxia
Recommendations:	Follow-up by occupational therapy Residential placement Continue placement in Day Training Center until residential placement

The parents were informed of the results of the evaluation. Whereas both parents appeared uninvolved at the onset of the study, during the evaluation they had been able to become involved. They had followed the suggestions offered them on feeding-training during the course of the evaluation and believed that James was making progress. The family had a good understanding of the extent of James' retardation and realized that his progress would be slow.

Several suggestions were given the parents regarding feeding skills training and gross motor activities. They accepted these, and the staff thinks they will follow through. James will continue in an all day program at the Child Development Center, Day Training Center with concentrated therapy in activities of daily living including feeding-training. Although the team believes the prognosis is less favorable for James than Ricky, hopefully some progress can be made.

Hazel Cole Capps, M.S., M.A. *

INTERDISCIPLINARY TRAINING

The interdisciplinary approach in clinical training is that force which promises to move disciplines to a more effective use of themselves in helping people in need, especially people with long-standing and multiple problems. Without demonstration of the method and without actual clinical practice, it appears unlikely that a professional will gain a full appreciation of how his own skills can be combined in a coordinated way with the expertise of other professionals to produce a program of care superior to that where services are provided in fragmented fashion.

The interdisciplinary approach is not a newly espoused philosophy. In 1896, Lightner Witmer, University of Pennsylvania, founded the Clinic for Stüdy of Children and described the ideal method for clinic operations as interdisciplinary. One can readily see the results of interdisciplinary functioning in current research, especially is it lauded in the areo-space field. It does not appear to have "caught on" in health related operations despite general acceptance on a verbal level. Dare we hypothesize that the major problem relates to the failure of academic programs to incorporate such training? In fact, most professional health workers have spent several years fully dedicated to a major field of interest, becoming strongly identified with a single body of knowledge and often enter the work world not fully informed regarding other disciplines, certainly not cognizant of the possibilities for health care when efforts are combined.

The University Affiliated Training Centers have been charged with the responsibility for providing interdisciplinary training. The task of establishing such a training program has not been an easy one. There have been many arguments against such training. Some argue that the ***time*** involved in exposing students to the disciplines other than the one they identify with is largely a waste, taking time away from more essential training. The argument relates to the difficulty of teaching students in a group who have varying backgrounds. The teacher cannot teach to his own student at the level of sophistication required and at the same time teach the same level of student whose skills and sophistication are in another area. Others argue that the result of such training only confuses the trainee who may begin to feel skilled in many areas and not fully appreciate his own areas of deficit, making him less effective as a referrer rather than better. Some propose that the product is a generalist with only superficial skills. More specific criticisms have been levied at centers who propose that no one discipline has the total answer, and that each one has equal status in determining patient evaluation and evolving treatment programs. It is argued that knowledge is not evenly spread and that some disciplines are "more equal" than others.

The difficulty in defending an interdisciplinary training program against such arguments is obvious. It is true that time becomes a factor when students are at varying levels, are from various disciplines and are in training for varying periods of time. Consequently, there must be considerable structure built into the programs. One effective means for providing orientation to students of other disciplines is for each discipline to operate a demonstration clinic with time for questions and answers. Programs established to demonstrate effective working together of the various disciplines are essential to training. This can be done during the original diagnostic and treatment phase or after the fact. For the student spending enough time in the Center, practice in his own discipline using the other disciplines as consultants promises to provide the ideal in interdisciplinary training. With the longer-term student, the possibility of a trainee feeling an accomplished Jack-of-all-trades is lessened. Time and the faculty provide the student with a realistic appraisal of his skills. Goals of training vary; for the short term, lower level student it may be that the training serves only to assist career selection, while at the other end of the spectrum, it provides training in-depth both in the student's own field of interest and in the interdisciplinary method. Programs must be designed individually with the goals of the individual known to each participating faculty.

Perhaps the most difficult criticism to deal with concerns equal status among the disciplines. Traditionally, the physician has played the role of leader. He has gathered reports from the various disciplines who might have studied the case and has pieced these together, made self judgments regarding diagnosis and treatment, and ultimately informed the parents or patient of his decision. An interdisciplinary approach can only work when all participants recognize that the nature of the case dictates the major participants. Only when the physician is willing to abdicate the throne as the case demands it and when other disciplines are willing to assume leadership responsibility can one effectively provide interdisciplinary service. Any attempt at interdisciplinary training is a farce unless it is based on good interdisciplinary service.

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Certainly it is not an easy matter to assemble a faculty dedicated to the above philosophy. Acceptance at a verbal level does not always mean that a person can actually adjust to the practice. Too often, without awareness, one slips back into the comfort of a familiar role. This is particularly true where one lacks self-confidence or where one is easily threatened. Faculty must be knowledgeable, secure in that knowledge and accepting of their own limitations. They must be relatively free from dependency needs and must be fairly flexible. They must have respect for other disciplines and the body of knowledge which others represent. Ann Heiss, in a discussion of the interdisciplinary approach in a nutrition meeting in Seattle, Washington, made the comment, "Successful interdisciplinary or cross-disciplinary programs are usually made up of groups of people who are willing to work together and are not so status involved that they are unwilling to face new learning. They are also characterized by the evenness of quality that is reflected in the staff and by their ability to agree at the level of overall theory."

It is recognized that training of the faculty is required. Without adequate, thorough training, many potentially good teachers will be lost. There is overlap in knowledge possessed by some disciplines. The nutritionist knows well that feeding of the handicapped is a major area of concern not only for himself, but for the occupational therapist and the nurse. There is considerable overlap between biochemistry, pediatrics and nutrition; this should serve to enhance the final product–patient health service. Certainly there is real potential for good training in such team endeavors. ***Interdisciplinary*** training is centered around central themes or bodies of knowledge that cut across academic boundaries, where the resultant is greater than, and different from, the combined contribution of the disciplines working independently.

Perhaps the most crucial aspect of an interdisciplinary program is its administration. Disciplinary loyalties must be discarded; loyalty must be to the team which will need an arbitrator occasionally, more often an encourager, always a supporter.

Once there is an effective team and an effective system, student training results in a broader base of knowledge. With the resources of multiple disciplines, students increase their own reservoir of knowledge, define for themselves ***who they are*** in terms of the contribution they can make to society and gain a full appreciation of the skills of co-workers. It is in such a protective setting that students define their future; hopefully, as professional health workers they will make greater use of themselves by joining with others for the benefit of those who cry for assistance.

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Mary Ann Harvey Smith, Ph.D. *

INTERDISCIPLINARY TRAINING FOR NUTRITION GRADUATE STUDENTS **

Introduction

The University of Tennessee Child Development Center serves as a clinical training facility for students enrolled in various universities in the Southeast. Training is offered in pediatrics, child psychiatry, pediatric neurology, opthalmology, otolaryngology, orthopedics, clinical genetics, dentistry, speech pathology and audiology, nursing, nutrition, psychology, social work, special education, biochemistry, physical therapy and occupational therapy. Training efforts are directed primarily toward graduate level students.

The unique feature of the Center is its dedication to an interdisciplinary approach to its service and training programs. This approach involves a cooperative group effort; the special skills of diversely trained professional persons are utilized collectively for understanding and resolving problems too complex to be understood or resolved adequately by any single profession. A combination of interdisciplinary and intradisciplinary approaches is utilized in training of students of all professional disciplines. In addition to intradisciplinary programs designed to develop or increase professional skills in the chosen specialities, each student must have contact with other professions and with an interdisciplinary approach to evaluation and treatment. The interdisciplinary contact develops knowledge and appreciation of the skills offered by the other disciplines and provides experience in functioning as a member of an interdisciplinary staff. In the training program all disciplines represented in the Center are available to all students for consultation. Training is integrated with provision of services to children and their families and is also offered through lectures, seminars, staff conferences and workshops.

Training Opportunities for Nutrition Students

Interdisciplinary training in mental retardation and other developmental disorders is available to nutrition students at the Child Development Center. The purpose of this clinical training is to acquaint the nutrition student with the interdisciplinary approach to diagnosis and treatment and with the role of the nutritionist in a clinical setting. The nutrition component differs from other disciplines at the Center in that it has responsibility for providing training for nutritionists in a large geographic area of the Southeast. Presently, an affiliation has been established with the Department of Nutrition, University of Tennessee, Knoxville. Further plans include establishment of similar affiliations with other universities in the area.

The types of training opportunities for nutrition students include clinical fellowships, traineeships and other training.

Fellowships

Clinical fellowships are available for students who have completed:

a. An approved dietetic internship.
b. Master's or doctoral degree in nutrition or public health nutrition.

Fellowships are offered for a period of ***one*** to ***three*** months. Students accepting these grants ***do not*** have to be enrolled in any degree-granting program during this period. However, graduate credit (3-9 quarter hours) may be arranged if the student desires. Continuing education credit from the American Dietetic Association is approved for the experience (30-90 clock hours).

The primary objective of this clinical training is to acquaint the practicing nutritionist or dietitian with the interdisciplinary approach to the diagnosis and treatment of the retarded and multiply-handicapped child. The training is generalized and covers nutrition as related to maternal and child health as well as handicapping conditions.

*** Chief of Nutrition, Child Development Center, University of Tennessee Medical Units, Memphis, Tennessee**

**** Adapted from paper presented at Nutrition Workshop, Child Development Center, June, 1969**

Educational experiences available to the clinical fellow include:

a. Observations of disciplines, other than nutrition, as they evaluate mentally retarded or developmentally handicapped children.
b. Observations of and participation in the nutrition evaluative process including data collection, interpretation and reporting.
c. Participation in nutrition clinics.
d. Observation and participation in interdisciplinary staff conferences and discussions.
e. Participation in basic core course on mental retardation and other teaching conferences.
f. Opportunities to meet with other community facilities to help insure a continuum of nutrition services for families at the Child Development Center.

The fellow carries out the above experiences under the supervision of a Child Development Center staff nutritionist.

Traineeships

Traineeships are available for students enrolled in a graduate degree program in nutrition at an acceptable university. Training at the Child Development Center for this student is more basic and requires closer supervision by the Child Development Center staff nutritionists than that of the clinical fellow. The training experiences for the nutrition trainee are planned as an integral part of his M.S. or Ph.D. program. The total training program is broad in terms of nutrition in maternal and child health, including mental retardation and handicapping conditions.

Traineeships may vary in length from three months to one year depending upon the needs of the students and the affiliated nutrition department. The general training objectives of the Center apply to the nutrition trainee, but in addition, specific objectives directed to the trainee are outlined as follows:

a. To become acquainted with the roles of various disciplines in the Center through observation and discussion with staff members both in conference and informally.
b. To gain insight into the nutrition evaluation process and become acquainted with preparation of of clinical reports by:
   1. Observing nutrition evaluations done by Child Development Center staff nutritionists.
   2. Conducting nutrition evaluations and writing clinical reports under the supervision of Child Development Center staff nutritionists.
c. To become acquainted with kinds of feeding problems common to children with mental retardation and developmental handicaps through:
   1. Observing feeding sessions for children in Day Care Centers and during their evaluation in the nutrition suite of the Child Development Center.
   2. Comparing feeding behavior of children in a normal kindergarten with that of children in EMR and TMR classes.
d. To become acquainted the multi-faceted role of the nutritionists in an interdisciplinary setting in order that she will be able to assume her role in a similar setting by:
   1. Learning about the administrative structure of the Child Development Center.
   2. Attending and participating in Staff Disposition Conference, Follow-Up Conferences and Informing Interviews.
   3. Observing internal committee activities of the Child Development Center.
   4. Learning about community resources through field trips and in-service programs.
e. To understand basic concepts of maternal and child health as well as mental retardation and handicapping conditions from the standpoint of many disciplines in order that she will be able to function well and make a contribution to the field by:
   1. Attending Core Course.
   2. Attending teaching clinics of all disciplines.
   3. Participating in interdisciplinary conferences.
   4. Attending and participating in staff teaching conferences and lectures.
   5. Developing a special problem related to nutrition for the retarded and/or handicapped, research the problem and present results to the Child Development Center staff in a teaching conference.

Other Training

Institutes and workshops for ***selected*** personnel who are involved and concerned with nutrition and feeding of children will be held periodically as specific needs arise.

Fieldwork Placement for varying periods will be offered to selected graduate students who have had previous public health nutrition experience. No stipends are available from the Child Development Center for this experience.

Orientation will be provided for selected graduate students, faculty members and practicing nutritionists. No fees are charged and no stipends are offered for this training.

Financial Assistance

Stipends:

Pre-doctoral experienced student support is outlined below:

Months of Related Professional Work Experience	*Stipend Level*
Less than 12 months	$ 3,000
12 - 23 months	3,300
24 - 35 months	3,600
36 - 47 months	3,900
48 or more months	4,200

Each full-time academic year of graduate training shall equal twelve months of related professional work experience for stipend level purposes. If a trainee or fellow has been awarded a master's degree, an additional $500 may be added to the stipend level for which he is otherwise qualified. The maximum pre-doctoral stipend may not exceed $4,700.

Post-doctoral student support is prorated according to the post-doctoral training and experience.

Years of Relevant Training and experience	*Stipend Level*
0	$ 6,000
1	6,500
2 or more	7,000

Dependency Allowances

Each fellow or trainee is entitled to an allowance for each legal dependent, at a rate of $600. Lesser rates may be approved when funds are insufficient, or when otherwise justified.

Other Costs

Standard fees and tuition charges may be allowable when justified. Costs of travel to the training institution from the student's home are not provided.

Housing

An apartment-hotel is located in the medical units and owned by the University of Tennessee. Twin and double rooms with maid service as well as efficiency apartments without maid service are available at nominal cost. Also, a new dormitory with private and semi-private rooms is located near the Center and has rooms available for short-term students.

Eligibility

Fellowship: Completion of approved dietetic internship and/or M.S. degree in nutrition or public health nutrition.

Traineeship: Trainees must be enrolled in an approved graduate program in nutrition and actively be seeking either a M.S. or Ph.D. degree.

All applicants must be citizens of the United States or non-citizens admitted to the United States for permanent residence.

Training Schedule

One-month fellowships are offered annually in summer. Three-month fellowships and traineeships are offered bi-annually in fall quarter and spring quarter.

Application

The deadline for applications for a specific term of training is the quarter preceding:

Deadline	*Session*
May 1	summer
July 1	fall
February 1	spring

Training Support

MCH-HSMHA, U. S. Public Health Services, Department of Health, Education and Welfare, Washington, D. C.

Lura M. Odland, Ph.D.[*]

AFFILIATED UNIVERSITY VIEW ON TRAINING OPPORTUNITIES IN UNIVERSITY--AFFILIATED CENTERS[**]

It is a pleasure to participate in this program today as a College of Home Economics Administrator and as a Nutritionist. I have been asked to comment on how training in University Affiliated Centers could enhance and broaden the overall opportunities for students in Home Economics. Of course, as Home Economists, we are interested in nutrition of children, both the so-called "normal" children and children with one or several of the various multiplicities of problems which children may encounter. When I last visited here Wanda Dodson, a student of ours, was leading a "case study" discussion group; and it was stimulating to me to see the mutual regard and respect the staff afforded the nutrition discipline and the participating students. When I came to Memphis that day, I had in mind a question to ask of the Director--namely--to what extent nutrition had developed as an integral part of the Center's program. However, this was efficiently answered when I learned that for the next year the nutrition staff was being substantially increased. Also this seminar on nutrition so strongly supported by the Center's administrators is evidence indeed that nutrition studies are an integral part of the total program supported by the total staff.

This mutual working respect from the various disciplines is rare. It is the basis, however, on which this program was established and without which the program could not function.

We in Home Economics in our overall view are concerned with every aspect affecting the family and its members. We attempt to concern ourselves among various areas within Home Economics with the total family needs in an interdisciplinary manner as exemplified by the Center's program. Every professional in Home Economics is concerned (or should be concerned) with the overall total family needs. I can very easily see how every department in our College could benefit by having program affiliations with such a Center as this and especially by having students involved in such a programm--because you also, at some point in your work with the children you serve, must touch on ***all*** family needs.

Our College is happy to offer the opportunity for joint faculty appointments. Whether these appointments are courtesy or formalized, this opportunity is conducive to cooperative undertakings.

Probably the one most outstanding learning experience of students participating in the training program is the understanding of how a truly interdisciplinary program may be focused on a problem situation. He sees that each person on the staff of the Center is secure enough in his own area of specialization to work with others in overlapping areas and to understand overlapping into his area. He becomes a part of a team effort with each member of the team trying to help in any way possible and at the same time in the most efficient way possible. He sees service, research and training as integral parts of solving the problem at hand. He learns to know what services are available from the many different viewpoints. He sees staff members from all geographical locations and learns to appreciate the contributions from all areas. He sees a continuing involvement of all staff for the benefit of the client, the future of the professions and society as a whole.

This concept of working with a particular problem from the various aspects in a team effort has been proposed many times. However, I know of no other situation where this concept is so competently carried through as it is here at the Center.

One can see very definite benefits from associations with the Center for students in each of the areas of Home Economics through the avenues of research, training and service. For instance, looking at Design and Crafts, a student could develop some very worthwhile projects of research and/or service in working with mentally retarded children. This is a problem area that has only barely been explored. Our Interior Design students could benefit a great deal in observations and in planning rooms for homes which could better meet the needs of mentally retarded children. Food Science and Institution Administration students could find various means of benefiting from the Center's program, such as development of foods and utensils best suited to children with special concerns. The wealth of information they could receive simply by being involved in the discussions at the Center is tremendous. The implications for Child Development and Family Relationships majors are so obvious that I will not discuss these further.

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[**] Presented at Nutrition Workshop, Child Development Center, June, 1969

Another, so-thought unrelated area might be Textiles and Clothing. But consider how very little work has been done to help the family know how to deal with clothing that children can manage on their own. Or one could consider the students specializing in Management and Family Economics. The problems a family faces with the additional pressures of a mentally retarded or particularly gifted child--problems not only of money management but also of time and energy management--must be solved. Students in this area will probably face professionally such family problems as they go out to work. They need to know first-hand what problems may exist and how they might be solved. The associations with this Center could better prepare a student for his own future involvement and for better assistance to the families he will serve.

I have mentioned just a few of the areas in which the development of Home Economics students could be enhanced and broadened by associations with a training center such as this. I do not plan to inquire concerning incorporation of students from all these areas ***next*** year, but in the future I do hope that we may be sending more students as resources may allow. I believe that your program could provide a realistic situation for all students interested in serving families--a realistic situation not only in terms of team work and participation, but also in terms of solving problems which may face them after graduation. I would like to conclude by congratulating ***all*** (both those located in Memphis and those in other locations) who have a part in the tremendous work which is being done here at the Center.

Beth Duncan, M.S., M.P.H. *

FEEDING THE HANDICAPPED CHILD: A CHALLENGE TO NUTRITIONISTS AND FOOD SERVICE MANAGERS**

In reviewing the program, I would like to go back to the two objectives for this workshop as stated by the Child Development Center staff. The first objective on "Feeding the Handicapped Child" was: "To acquaint us, the participants, with the evaluation of skills in feeding-training of developmentally handicapped children." Now, the key word in this objective is "acquaint." They did not promise that we would acquire skills in feeding-training of developmentally handicapped children. Do you think the staff has met this objective? The second objective was: "To make the participants aware of the contributions of each discipline in feeding skills development." Now, I will emphasize that the key word here is "aware." Repeating, "To make the participants ***aware*** of the contributions of each discipline in feeding skills development." These are the objectives that were set-up in planning the program and in inviting the participants for this workshop. It is my understanding that these objectives were selected because of the lack of training among food service supervisors, dietitians, nutritionists and administrators who are working in mental retardation facilities.

It was stated in one of the reports that regardless of whether we are food service supervisors, administrators, dietitians or nutritionists, our training has been lacking when it comes to working with mentally retarded children. I know that I have not had this kind of training and education. It is because of this need that Dr. Harvey, Miss Brannon and Mrs. Coffey planned this well-organized workshop. I think you will agree that it was well-organized, had excellent facilities and informed speakers. It is gratifying and reassuring to know that we have a training center with a competent nutrition staff, such as this one, that can give us advice, provide us with training, provide consultation and give assistance so that we can go forward in working with developmentally handicapped children. I plan to look to this and other university affiliated staffs in this region for help and guidance in this area.

At this point, I would like to ask you, as participants, what were your objectives when you decided to attend this workshop? We know why the staff planned the workshop. We know their objectives because they wrote them down. Why did you want to come to this workshop? Was it because you needed continuing education hours to become or to stay a Registered Dietitian? Did you want to meet other people to exchange ideas? Did you come to Memphis because you wanted to visit someone? Each of us will have to answer why we came. If we do not know why we are here or if we did not get one or two ideas of what we are going to do when we go home, then this has been a very expensive workshop. Too often, we go to workshops, we hear a lot, and then we go home without committing ourselves to some action. I wanted to mention this because I do think we need to give this thought some consideration.

Now, some random comments, and they are random, about the program for the past two days. The staff planned a combination of didactic presentation of facts, television observation and problem solving cases. We have had a variety of ways of exchanging and getting information. Some of the feeding disorders that were presented for observation and evaluation were: (1) feeding disturbances not caused by emotional factors, but which are seen as a part of the neurologically impaired child; (2) feeding problems not specifically caused by emotional factors, but certainly enhanced by them, e.g., delayed development; (3) feeding problems due to emotional factors.

A feeding problem that was mentioned in our group discussion, but not observed in the videotapes, is overeating. If you saw an example of overeating in your observations then I stand corrected. Another problem that I did not observe is pica. This problem is probably found more in the home than in a controlled situation. Several speakers made reference to the fact that the child in an institution usually has a problem, and this problem is sometimes caused by improper stimulation from his environment. This was also brought out in some of the group discussions.

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**Presented at Nutrition Workshop, Child Development Center, January, 1971

The purpose of any kind of treatment for children with developmental deviations is to give them the greatest independence possible and to prepare them for adult life. Yes, the greatest independence possible. The treatment, whether it is by feeding or by the diet, can do no more than help develop the child's potentialities. Children with deviations in feeding behavior present many problems which, as has been stressed here, require a team approach. This is usually a team of specialists to assist and to be involved in treatment. In considering feeding problems, we must remember that we deal with the total child, the total personality of the child and total child with special needs. We must consider emotional, social, intellectual and physical factors. A good assessment requires a consideration of the child, his place in the family, the community or institution or wherever he may be, as well as the evaluation of his development. In this Center the interdisciplinary approach is used. By having this kind of workshop, we are beginning to get exposed to the interdisciplinary approach. This should at least make it easier for us to communicate with other disciplines. We should have a better idea of what a dietitian or nutritionist can do in an institution or center. The dietitian and/or nutritionist should have a better understanding of the role of the physician, the nurse, the occupational therapist, the physical therapist, the social worker and others. The interdisciplinary approach is easily written on paper, but it is more difficult to achieve in practice. Often, we think that dietitians, food service supervisors and nutritionists are not well recognized and people just do not appreciate or understand our work. As a result, we strive very hard to try to reach some type of identity. We have heard that in an interdisciplinary approach we have to move in the opposite direction. We have to give up some of our independence if we are going to work effectively on a team. It does mean giving and taking if we are going to work on a team. We often make the mistake of focusing on our profession and not on the people with whom we are working. We will begin to approach the interdisciplinary concept if we will focus our attention, our professional skills on the people we are trying to help in this case, the children. From some of our discussions, our work and our past experiences, we have learned that we, too often, focus our attention on the tools with which we work rather than on individuals. Too often as professional persons we put the emphasis on the food rather than putting the emphasis on children. This is the wrong approach. We should put our emphasis on meeting the needs of children and, in our case, it would be meeting the needs of each individual child through food. We can have the most wonderful food coming out of the kitchen, but unless it is consumed by the individual, unless it meets the nutritional and other needs of each child, then we have failed in our professional duty. Let us put our focus on children.

Food is a necessity of life, but again unless it meets the nutritional needs of the child, then we have not succeeded. This is easier said than done, particularly if you are the only professional dietitian and you have the responsibility for food service for thousands; and there is no occupational therapist and very few other professionals. Then what do you do? If this is your situation, the first time you try, you may not reach the desired level of communication or working together that is needed. Even so, we still have a professional responsibility to work with physicians, social workers, nurses, or the nurses aides or whoever it might be. Our professional responsibility is in the area in which we are trained and educated. If we do not assume this professional responsibility, others with less skill and less knowledge are going to assume this responsibility for us. In fact, they are already doing it. We should step forward. We should assume leadership in ***our*** own field and not leave it to those with less training, less skill and less knowledge than we have. It was stressed by several of our speakers that each child is "unique," each child is different, each child has his own needs. The same is true with each individual in this room. Each one of us has certain abilities, certain failures, certain competencies and each one of us is different. We must use whatever abilities we have in the feeding skills to meet the needs of children. In meeting the needs of children we have to understand the concepts of normal development. We have to understand normal development to be able to evaluate deviations.

It was stressed in this workshop that teaching handicapped children does require special skills. We may have special skills, but we also have to keep in mind factors other than skills in which we should be competent. There are reasons why children do not eat. If a child is angry with his parents at mealtime, this may cause the resistance or refusal to eat. Some children display disruptive behavior at mealtime to get attention. We had an occasion this morning to observe disruptive behavior as a way of getting attention. Many circumstances might cause a child to be unhappy and depressed. This could also manifest itself in not eating. This is true for adults as well as children; however, it is probably more obvious in children than in adults. As we go about our work, we have to be cognizant of the psycho-social aspects of feeding children. When we are providing a balanced diet, we should remember to give the child small servings, ample time for chewing and eating and have a relaxed atmosphere. This way we should end up with a happy child and perhaps an adequate diet.

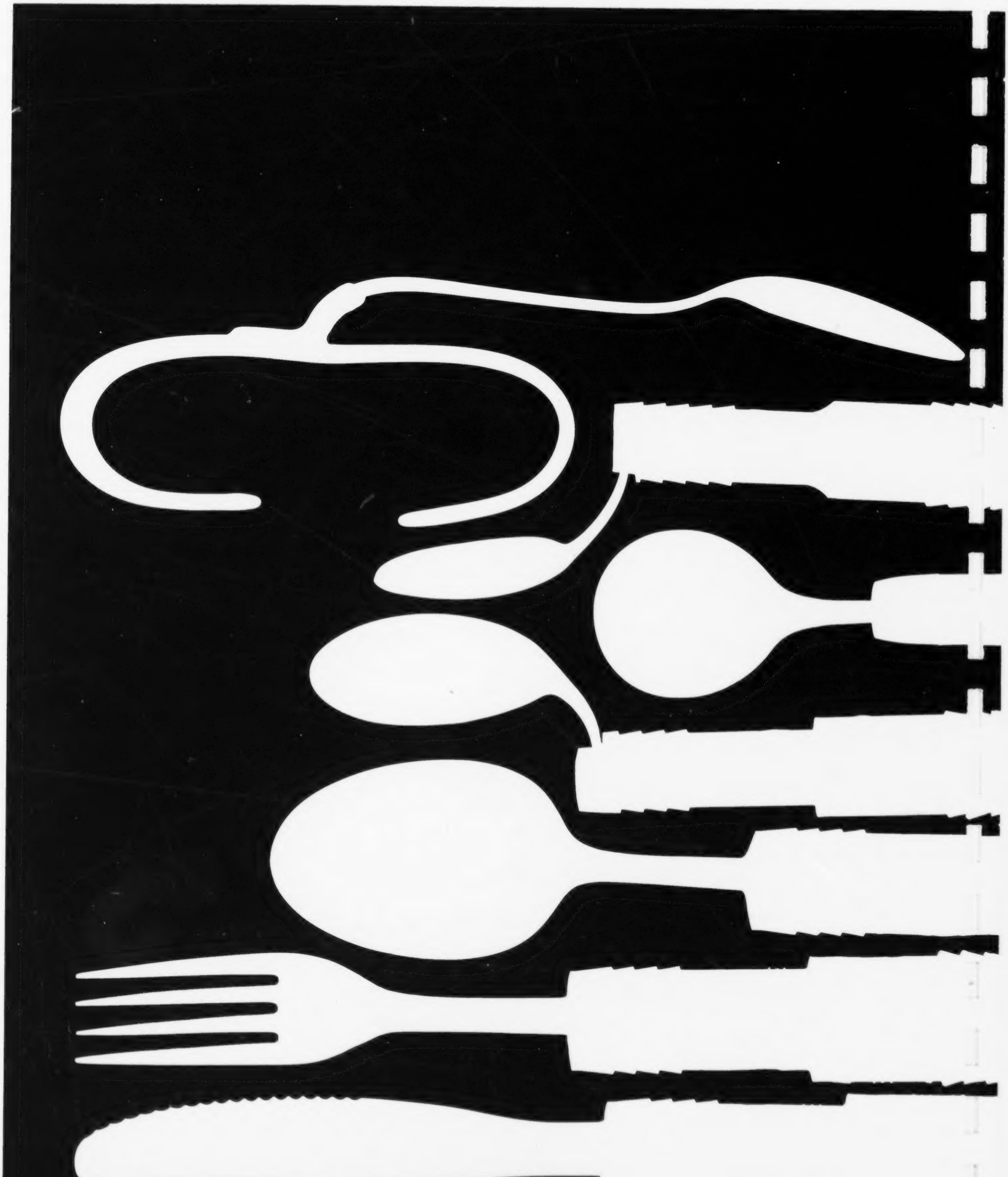
As far as I can determine without any surveys or research, the most poorly fed groups in our society are probably mentally retarded children in institutions. I hear, over and over, that liquid diets, or semi-liquids, are routinely given to all children, and the individual child may not have his needs met. Every child is fed the same, regardless.

You are to be commended if this is ***not*** true in your institution. If this is true in your institution, then you have an obligation to go back home and work for improvement. We certainly are not going to solve problems by blaming other professionals. It is time for us all to stop "passing the buck."

We also have to do a selling job to the public. Some people say "why waste money where we do not have normal children." In this country, every individual should have an opportunity, and it is our responsibility in the field of mental retardation to make this possible.

The physician is the quarterback on the rehabilitation and feeding skills team. The quarterback calls the signals. Are we the fullbacks? Too often, as a fullback, we just stand there and say "when is the quarterback going to bring me the ball?" You can imagine what would happen on a football team if we did this. Well, we would be "clobbered." Sometimes we are "clobbered" professionally because of similar action. The physician calls the plays and we stand there. When have we taken the initiative on the team? To play on the team, we have to make ourselves available. This can not be done by being stuck in the basement, a corner room or a broom closet of a hospital or institution. Is it time for us to move out and become a team member rather than putting all our time on food service? We have complained that others do not know what we do. But, do we know what they do? I have learned about the role of the occupational therapist in this meeting. Do you know the role of the psychologist, the social worker, the public health nurse, the teacher and the parents? I have not mentioned all the members of the health team. We need to know how each can help us in meeting our responsibilities. We need to keep them informed as to what we can do. So, I ask you a question. As a member of the health team, what can a dietitian or nutritionist do professionally that no other member of the team can do? If you are an administrator, you should ask yourself, "What is my role as far as feeding skills of children are concerned?" If you are a food service supervisor, "What is my role as a food service supervisor; what can I do that no other worker can do?" These are difficult questions, especially for dietitians or nutritionists to answer. What can we do that the physician can not do? What can we do that the nurse can not do? What can we do that the occupational therapist can not do?, etc. When we can answer these questions in our own minds and in our own situations, then I think we can move ahead in working as team members.

In closing, I wish to say again that this has been an excellent workshop, but it is only the beginning. To my knowledge this is the first time this group has been together to discuss this subject. The workshop staff is not going to solve all our problems. They have given us a lot of answers and have given us many things to think about. We can look in the future to this Center and training facilities within our own state for help and guidance. Our continuing education should not cease. Again, what were ***our*** objectives? Why did we come to this workshop? What one thing will each of us try to accomplish when we return to our jobs? How will we use this knowledge we have gained? How will we help improve the feeding skills, the nutritional status of the children that we work with? Let us return home determined to make a start.



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